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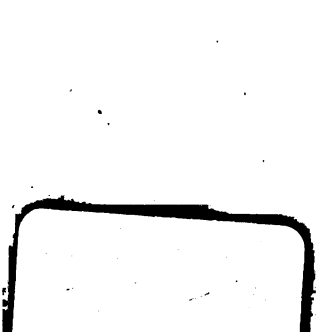

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COLLEGE OF DENTISTS OF ENGLAND.

LECTURES ON THE MEDICAL HISTORY AND TREATMENT OF DISEASES OF THE TEETH, AND THEIR ADJACENT STRUCTURES.

By BENJAMIN W. RICHARDSON, M.D.,

Licentiate of the Royal College of Physicians; Physician to the Royal Infirmary for Diseases of the Chest, and Lecturer on Physiology at the Grosvenor Place School of Medicine.

LECTURE I.

THE CONSTITUTIONAL AND GENERAL CAUSES OF SOME DISEASES OF THE TEETH AND THE ADJACENT STRUCTURES.

[*Delivered November 9th*, 1858.]

Mr President and Gentlemen,

Before entering on the subject proper of the present lecture, I cannot omit the pleasure of expressing to yourself, Sir, the Council, and Members of this College, the gratification I feel at the honour of having been invited in my capacity as a teacher of medical science, to the exercise of my calling in this place.

Nor would it be grateful in me to forget an act of great kindness, in connexion with the honour of the invitation. Feeling, doubtless, that your lecturer, engaged as he is, not in the special field of dental science, but in collateral pursuits, could not be expected to treat on those special subjects which constitute what may be called the direct science of dentistry, the Council of the College, with quick delicacy of feeling and of action, gave to him the selection of each subject of discourse; intimating to him, through you, Sir, that subjects of a collateral kind would be acceptable to the members, and that a physician speaking to them as a physician, and taking a physician's view of dental diseases, would be heard with satisfaction.

But for this extension of privilege I could not, however gratifying the invitation, have accepted these duties. As it is, I enter upon them not merely freed from much embarrassment, but with pleasure, since I am enabled to take for my discourses such texts as, to an observer of the general phenomena of diseases, offer the means of describing the history of the relationships which exist between the local phenomena of a special order of diseases, and of diseases as a whole; such texts, in

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short, as will allow me to hold up to those who are engaged in dentistry proper the medical aspects of their science.

Nor do I fail to anticipate that some benefit may accrue to us all in this attempt at blending the general and the particular. One half the world knows not how the other half lives, says the old proverb. One half the science-world knows not what the other half thinks, would be another allowable version of the same maxim. So I hope that, from a representation of what the medical half of the science-world thinks on the matter of dental diseases and their treatment, the other half—brothers in science—may gather some fruitful suggestions, and even from the errors of medicine borrow wisdom—

> "For there is a soul of truth in things false,
> Could men observingly distil it out."

The general title of this course stands as follows:—"The Medical History and Treatment of certain Diseases of the Teeth and their adjacent Structures." In the divisions of the course no attempt will be made towards classifying or systematising the subjects. Taking up each text given in the syllabus, I shall make each lecture an independent essay.

On the present occasion there are before us for discussion,

"The Constitutional and General Causes of certain Diseases of the Teeth and their adjacent Structures."

In this lecture we shall review in a general sense, much which in after lectures will form the subject of particular study. Without design, therefore, this is naturally and in reality a lecture introductory to the whole course.

It may be well at the onset of our labours to consider the meaning of the terms "local disease," and "constitutional disease," in their relations to each other.

Our common phraseology supplies us with this division of diseases into local and constitutional; long custom sanctions it—practice clenches it. Since the days when the Father of History, travelling through Egypt, wrote some two thousand years ago, "that one Physician is confined to the study and management of one disease; that some attend to disorders of the eyes, others to disorders of the head; some take care of the teeth, others are conversant with intestinal disease, whilst many attend to the cure of maladies which are less conspicuous;" from then till now, I say, in the division of labour necessary for the treatment of diseases, classifications of diseases have been taken as the bases of the divisions of labour, and in a social sense at least, this arrangement, when not over-driven, has worked well. Practically, therefore, it were better to let it alone.

But if we take this matter into consideration on a higher ground; on philosophical argument, we shall find that the division of diseases into "local" and "constitutional" forms is arbitrary, and does not rest on close observation of nature. We

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shall find that the most local type of disease, local as regards place, position, and origin, lapses always into constitutional derangement, more or less severe; while in the majority of cases the origin of local disease is due to a preceding systemic disorder; in other words, to a constitutional cause.

Great care at the same time requires to be taken in reference to the use of the term "constitutional origin," especially in its application to the production of local disease. It were better, in fact, to use the term "*systemic origin*" rather than constitutional, and it were better still to say that a local disease is produced *through* the constitution or *through* the system, than to say that such diseases are of constitutional or systemic origin. For, when we come to speak of origins truly, we must pass out of the body altogether and look for them in *external* causes alone. The body, in fact, in itself is perfect as a healthy whole. It cannot by its physiological conformation produce any kind of disorder local or general. It can only be deranged by the medium of external agencies, which affect it by one of three ways—*physically*, as when it is subjected to accident; *chemically*, as when it is subjected to the influence of a poison; *physiologically*, as when by some abnormal condition in which it is placed, the normal acts are deranged and changed into pathological conditions.

A ladder slips from me, and I am brought to mother earth, with dislocation of my shoulder or cracked head. A physical external cause forsooth happens to me. I take mercury to saturation, and a train of ineradicable evils follows. A chemical external cause has laid hold of me. I eat and drink too much—I eat and drink too little; I sleep not enough—I sleep too long; I tax my body over-hard—I tax my brain; and causes acting on me from without, and physiologically, mark me; as a consequence, I contract gout, or marasmus; muscular hypertrophy, or mental imbecility; the disease according to the cause.

To apply these considerations to the particular subject now before us, we may learn,

1st. That the most local disorder—of the teeth, for example, such as arises from injury, compression, or the action on these organs of a chemical agent—will extend more or less to the body at large.

2ndly. That when a local affection, say of the teeth or their adjacent structures, occurs, as the result of constitutional mal-condition, the true origin of such mal-condition is through the system, not of it; that is to say, from some external influence acting constitutionally.

Against the rule here urged as to the external origin of diseases, one exception might be claimed. While it would generally be admitted that the constitutional disorders which arise from accidents, from the effects of poisons, organic or inorganic, from the effects of insufficient or over-sufficient foods or

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drinks, from uncleanliness, from atmospheric variations, and from occupations and pursuits, have clearly an origin out of the body, it may be argued that those diseases which pass from parent to offspring, and which are known as *hereditary*, certainly are derived from simple derangement of the organism itself, and independently of any influence from without. This argument is in part true, and in part false; true as regards present agency—false as regards primary agency. For the fact is, that the child lives in the parent; and the origin of all hereditary diseases and their local consequences, whether of hereditary syphilis or hereditary gout, is in the mysterious chain of generation traceable back to an external beginning. A progenitor received the disease from without, and transmitted it on.

I have introduced these remarks, that I may not be misunderstood in the use of the term "constitutional disease." At the risk of seeming wearisome, I must repeat that, in what I shall have to say in the sequel on the influence of systemic derangements on the organs of mastication, I shall define diseases of those parts which have their origin from without, through the medium of the body.

We have seen in our previous remarks that local and constitutional disorders hold two relationships—that the local disturbance may take precedence, and act as the indirect cause to the constitutional malady. We have seen that the reverse obtains also. We might therefore, in taking up the diseases which affect the masticatory organs, follow two courses in the way of connecting these special disorders with such disorders as are systemic or general. We might trace those constitutional derangements, which are due to primary affections in the organs of mastication, back to those diseases which are most purely localized in the first instance; to the caries, for example, or the necrosis which occurs in the teeth from the direct effect of chemical or physical agencies exerted on these organs. Or, reversing the study, we might trace out the origin of those diseases of the organs of mastication which arise through the system, and are developed as the simple sequence of constitutional mischief.

In a comprehensive sense, these two points are inseparable; but on the present occasion our attention is confined particularly to that last named.

Keeping, then, more especially to those diseases of the teeth and their adjacent structures, which have their origin from external causes operating through the body at large, one sees on reflection that while several diseases specially pertaining to the teeth themselves, namely, caries, necrosis, inflammation, and the nervous manifestation which we call ache or pain, may and often do arise from direct local mischief inflicted on the parts themselves,—these said diseases may also have a constitutional basis, while all other affections of which we shall have to speak, to wit, hæmorrhage, neuralgia, dyspeptic and gouty toothache,

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exostosis, malignant diseases, and diseases arising from inorganic poisons, are, as a general rule, traceable to the diseased part solely through the constitutional medium.

We have seen already that the body itself is by its physical conformation incapable of producing any disease, and that diseases which are developed through it are the consequence either of physical accident, of poison introduced into the body directly, or of derangements of physiological acts, induced by external agencies.

In considering the diseases of the teeth as due to constitutional causes, we may exclude those constitutional derangements which spring from accident; and confine ourselves to those which arise from poison, or from disturbed physiological function. But even with this limitation a long list of maladies may be traced to constitutional derangement.

The poisons which act upon the body to produce various forms of systemic disorder are a numerous class, and are of profound interest to the physiological physician. Many of them, from their ultimate local effects, are scarcely of less interest to the practitioner of dentistry.

The more common of these poisons we call inorganic; and this class, in so far as an influence on dental disorders through the system is concerned, includes mercury, phosphorus, lead, and the caustic alkalies.

A second class of poisons which through the system affect the teeth, are called organic. The special mark of these poisons is, that they, like organized manifestations of higher caste, are capable of reproduction; that, as seeds sown in the ground find under favouring conditions of soil and weather a *habitat* in which they can be reproduced a hundred-fold—so those sown in the animal body find, under favouring conditions of body and of atmosphere, a *habitat* in which they can increase a hundred-fold also, and by their increase and presence light up systemic disorders, the results of which lead to the inevitable formation of some local manifestation more or less severe.

Of this second class of poisons, a few are of immense importance in reference to the constitutional origin of dental diseases. In this class, for instance, we include that formidable of formidable poisons, that insinuating of insinuating poisons, that lasting of lasting poisons—the poison of syphilis. In this class also we include the poisons of the acute infantile epidemic diseases,—to wit, of scarlet fever, measles, small-pox, and the poisons of the typhus, typhoid, and yellow fevers.

Now it is a marked peculiarity of these organic poisons, not only that they are reproductive in the animal body, but that they are transmissible from one body to another body, and from one generation to another generation through the predecessor.

All these diseases are transmissible in the period of pregnancy from the mother to the child; and one *par excellence*,

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syphilis, proves its transmissibility by this means, in a manner too unmistakeable to be ever denied. As we pass on, we shall see the bearings of this fact of transmission in all its force.

There is a third class of poisons, which are also of interest to the dental practitioner. Their nature is obscure—their *modus operandi* hard to understand. Whether they are organic or inorganic, we cannot say. We have honoured them with a name; in our ignorance of their nature we call them malarious poisons, —bad airs, in Queen's English. We name them as we name a comet, in general terms, and in ignorance of their nature.

We know, however, something about the laws which govern these poisons; and we know a great deal, often from sad experience, of their effects as poisons.

We know that they emanate from foul places; we know that they are not transmissible from person to person, and thence we infer that they are not organic; we observe that their effects are limited to the period during which the body is subjected to them; and we trace out, that the symptoms to which they give rise are, through the system, developed at the extremities of nerves, in the nerves of teeth especially. We trace neuralgic tooth-ache, in short, as often originating in a poison of this class; and did we inquire, we should possibly find this poison more active than "the gentlemen of England who sit all day at ease" are given to suppose.

Without trespassing too much on the subject matter of forthcoming lectures, I may glance for a moment at the influence exerted through the system by certain members of each of these classes of poisons.

It would be taking, I think, unproven argument, in recalling before us the inorganic poisons, to assert, as some do, that such poisons act invariably through the system; that they are absorbed by the returning blood, carried to the right heart, thence through the pulmonic circuit to the left heart, and so by arterial trunk to all extremities, bathing all tissues and electing certain, as tooth or its adjacent bone-structure, for the manifestation of their effects as poisons. There are grounds for belief, that the action of some inorganic poisons which affect the teeth and adjacent parts, may be by direct local influence; phosphorus and lead are two poisons which I would, on the present occasion, leave in this doubtful category.

But one poison, much more important than any other to the surgeon-dentist, is of the class that passes through the system to the tooth-structure, and inflicts its mischief in no other way. I refer to *mercury*. We have experimental proof of the constitutional medium in this case. The poison may be rubbed into a limb, may be taken by the mouth, may be inhaled in fumes, but the effect, if the effect is carried far enough, will, *cæteris paribus*, be the same as regards the dental structures. The partially disintegrated and poisoned blood, as it bathes the tissues of the body, injects

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the vascular structures and refuses nutrition to those of fibrous or vascular build; hence the mercurial malady in relation to the teeth begins not in the tooth structure truly, not in surrounding bone structure truly, but in the membrane that connects tooth and bone—the periosteum, and in the vascular structure which encircles the teeth to their crowns—the gum.

In the after steps of the process, the body of the tooth does, however, in its turn suffer; partly, it may be, from the tooth itself being bathed in poisoned saliva, but more decidedly from the destruction of the connexion between the tooth itself and its socket, and, by implication, of the vessels which supply to the inner structure of the teeth their nutritive pabulum.

It is a matter as yet open for inquiry, how far some other common poisons introduced into the body may exert an influence on the nutrition of the tooth. I have heard of *iodine* producing injurious results in this way, but can find no reliable data of the fact; and in such cases as the iodism produced by iodine have been observed by myself (to the best of my recollection in three cases), no injurious results to the teeth followed.

I saw a case once in which *oxalic acid* was taken in a poisonous quantity, but in which the patient recovered: in this case profuse salivation was a leading symptom, and at one time every tooth was loosened. During a portion of this period, as experiment proved, the saliva was taking its part in eliminating the poison, so that the teeth were constantly bathed in acidified saliva. Notwithstanding this, as recovery progressed, the teeth became again firm in their sockets, and appeared, when convalescence was complete, to have undergone no organic change.

The effects of *arsenic* taken in gradual doses into the system have not been, as yet, sufficiently investigated in relation to the teeth. It is known that this poison, acting through the system, produces ulceration of the mouth and of the gums, but this is all that has been ascertained.

Antimony, which in its systemic effects closely resembles arsenic, seems to leave both the teeth and their adjacent structures free from injury. At least, this is the result at which I have myself arrived, from observation of the effects of the poison, both in man and in inferior animals. In the course of the researches from which this deduction is drawn, eleven animals were kept under the influence of the poison for long periods.

In some examples, where antimony is carried to its extreme effects in the treatment of disease, a pustular affection extending over the whole of the body has been a result. I had the opportunity of seeing this extreme effect once produced in a case of acute pneumonia in the human subject. In this case the pustular eruption extended over the whole of the body to such extent that, in ignorance of the cause, small-pox might at first sight have been supposed present. The interior of the mouth

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was covered with the eruption, but the gums escaped altogether from purulent disorder, or ulceration.

The *alkalies*, when carried to excess, exert a very decided influence on the system at large, and indirectly on the teeth. The general symptoms produced by the alkalies are those of low fever, attended with fluidity of blood, convulsion, and comatose death. In their special influence on the teeth and adjacent structures, they produce sponginess of gums, disconnection of the tooth from its socket, and all the consequences, in so far as these organs are concerned, arising from the continued use of mercury. Carried far enough, all the caustic alkalies, viz. potass, soda, and ammonia, appear to have the same effect on the inferior animals; and it is interesting to know that a similar effect may be produced by them in man.

I have seen potash water administered to such persistent effect, that a state resembling ptyalism was the result, but the most notable illustration of the effect of alkaline bodies is the following case, recorded by the famous Dr Huxham.

"I had once," says Dr Huxham, "under my care a gentleman of fortune and family, who so habituated himself to the use of vast quantities of the volatile salt that ladies commonly smell to—carbonate of ammonia—that at length he would eat it, in a very astonishing manner, as other people eat sugared carroway-seeds, *with a vengeance*. The consequence was that he brought on a hectic fever, vast hæmorrhages from the intestines, nose, and gums, while every one of his teeth dropped out, and he could eat nothing solid. He wasted vastly in flesh, and his muscles became as soft and flabby as those of a new-born infant. He broke out all over his body in pustules. He was at last with great difficulty persuaded to leave off this pernicious custom. He rubbed on in a miserable manner for several months, but died tabid and in the highest degree of a marasmus."

The constitutional effects produced by the long-continued use of *opium* remain to be more carefully studied in reference to its action as a poison on the masticatory organs. In confirmed opium eaters, the gums in which the teeth are firmly set have a shrunken and pale character: the teeth themselves presenting little indication of disease. This observation relates to adults who are given to the practice of taking opium in large quantities, and one might infer from this that opium does not affect specially the dental structures; but I am inclined to think that amongst the children of the poor who are drugged with opium, not only is the second dentition seriously impeded, but the temporary teeth are small and dark, deficient in enamel, and very liable to caries.

The poisons of the second class, those which give rise to the epidemic infantile diseases, are not without their interest in relation to the constitutional results on the masticatory organs. Dr Chapin Harris, I find, in describing the disease sometimes

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called odontotrophia or atrophy of the teeth, describes a form of the disease in which he thinks he can ascribe the disorder as a consequence of *eruptive disease*. He gives in his very able work a general history of seventy-one cases of atrophy which came under his observation during a period of eighteen years. The following is the result of his inquiries. In thirty-eight cases the patients had had measles, and, as nearly as he could ascertain, some time during the formation of the enamel of the teeth. In six cases the children had had chicken-pox; in four, scarlet fever; in three catarrhal fever; in two, small-pox; in one, the mother had had an attack of varioloid about seven or eight weeks previous to her accouchement; but in this last case the atrophied teeth belonged to the temporary set. With regard to the other seventeen cases, Dr Harris was unable to obtain any reliable information. The cases, he adds, would seem to establish the fact that, although the affection is caused far more frequently by eruptive than any other form of constitutional disease, it may nevertheless occasionally result from other diseases.

Dr Harris further describes another form of atrophy, in which the whole or part of the crown of the tooth is affected, the dentine being often implicated as well as the enamel. This tooth, according to his description—and it is a description of disease which one is constantly meeting with in dispensary practice—usually has a pale yellowish colour, a shrivelled appearance, and is partially or wholly divested of the enamel. Sometimes the crown is not more than one-half or one-third its natural size. Its sensibility is usually very greatly increased, and its susceptibility to pain from external impressions is wonderfully increased by acids. It is also more liable than the other teeth to be attacked by caries. The root of the tooth is sometimes, though rarely, affected, and presents an irregular, knotted appearance. The disease is often confined to a single tooth, but more frequently shows itself in two corresponding teeth in the same jaw, the bi-cuspids being more liable to the attack than the other teeth. The temporary teeth are rarely affected by it.

In these cases, Dr Harris is evidently inclined to trace back the disorder to pre-existing constitutional disease, and specially to diseases of the febrile eruptive type.

While I have thought it proper to adduce these views of Dr Harris as to the origin of dental atrophy in the eruptive disorders, I cannot but point out that there are certain sources of fallacy in his deductions, or rather that there are other possible causes at work giving rise to the disease. At least two deserve special attention; I mean the influence of mercury, and more than all of syphilis. An observation made by Mr Fox in reference evidently to the same dental disease, atrophy, that when once this disorder occurs in one child of a family, the other children are generally subjected to the same condition (a remark which is, I

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believe, borne out by practical observation) would certainly point to a constitutional origin of the disease, and to a common origin which is neither the epidemic of small-pox, scarlet fever, or other exanthem, but a much more general epidemic, I mean syphilis.

Do then the eruptive diseases exert any influence on the teeth or their adjoining structures? I think we may say in this day, that if these diseases are let alone, or rather if they are not over-treated, humanity is pretty well saved from their after-effects in so far as the organs of mastication may be considered. But there is unquestionably one of them which did in old time, and before the era of one of our immortal countrymen and science-brothers, leave its impress on all organs, and on those of mastication not the least.

In the palmy days of *small-pox*, the concurrent testimony of all authors is to the effect that the poison of this disease, like that of mercury, left behind it special dental maladies, consisting chiefly in inflammation of the periosteum, exfoliation of the alveolar process, and loss of teeth. One can scarcely, indeed, recall or accredit such histories as the following one written in the present century by Mr Fox.

"In the excellent museum of Mr Heaviside are several specimens of exfoliations which have been occasioned by the deadly operations of that loathsome pestilence. This very curious exfoliation is from the under jaw of a little boy, of about four years old, from matter formed between the gums and the bone after small-pox. As soon as it became pretty loose, the whole was carefully removed, and shows itself to be the substance of the lower jaw with some teeth in it. A small portion of the anterior part of the upper jaw also exfoliated, with two of the incisor teeth and two secondary teeth."

There can, I repeat, be no hesitation in accepting the fact that this one of the epidemic diseases produces material injury to the teeth; but I would again repeat, from my observations of the infantile diseases, that they have much less to do with the production either of atrophy of the teeth, dental gangrene, or necrosis, than is ordinarily presumed to be the fact in works on dental surgery. I find Professor Bell, for instance, stating that the whole list of infantile diseases operating during the formation of the permanent teeth are to be considered as so many causes predisposing to gangrene. And again I find him naming fever, by which I presume he means typhus, and which fever, like the exanthems, depends on specific poison, as a cause of dental necrosis. Now I take it from observation of these diseases and their effects, rather than of the after effects attributed to them, that the effects are not due to the diseases themselves, but when isolated from pre-existing syphilis, are due rather to a mercurial treatment pursued for the cure of the diseases. This at all events is my experience: that when in public practice children are brought to me in whom the atrophied tooth or the

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carious tooth are markedly present, the first on inquiry resolves itself into a syphilitic origin; the second, though often attributed to measles, to scarlet fever, and the like, to a mercurial origin.

Certain it is, on the other hand, that the whole of the infantile diseases (small-pox excepted) may occur during the formation of the permanent teeth, and yet a set of permanent teeth may follow as perfect as may be desired. I shall on another occasion refer to the remarks of Mr Salter on these subjects.

I have alluded incidentally, on several occasions, to *syphilis* as a constitutional source of dental disease. I cannot over-estimate this subject. We know in these days that the origin of the disease is in specific poison, and we know the mode in which it is communicated, although in the sixteenth century many doubts surrounded this very simple subject, and syphilis, like other epidemics, was attributed to atmospheric changes, the influence of the stars, and such like agencies. We see now that the poison does not stop with those whom it first attacks, but is transmissible on from parent to offspring, stopping, perchance, not at the first generation. We observe that through either parent the disease may be produced, and we prove the influence of this fact by the circumstances that the large majority of children prematurely born and still-born, are so born as a consequence of syphilis, and that out of 88,784 children dying in England in one year from all causes, no less than 255 die from syphilitic disease.

The peculiarity of the syphilitic virus consists in two facts (I am speaking now only of its secondary effects), first, that it acts as a general poison, suppressing the nutrition of all parts, and secondly, that it leads to special derangement of nutrition in the osseous and fibrous textures of the body. I do not think it yet proved that syphilis contracted in adult life, and taking its unimpeded course, interferes materially with the dental structures, for here again the influence of mercury in the treatment comes into play so often that it is difficult to separate the effects of one poison from the effects of the other.

In reference to the effects of the syphilitic poison on the development of both the temporary and permanent teeth, the influence is undeniable, and I think it possible that there is scarcely any chronic disorder of the dental structures which is not influenced more or less by the effects of the syphilitic diathesis, when this is present. But there seems also to be a special affection of the teeth due to the hereditary syphilitic disease. This subject has lately been investigated with considerable care by Mr Jonathan Hutchinson, who has arrived at the conclusion that there is a peculiar condition of teeth which results from the influence of hereditary syphilis, and that the most frequent features of the condition are the following: A, smallness of teeth; B, notching; C, colour, which is a dirty grey; D, wearing down; E, a confinement of these signs almost entirely to the incisors

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and canines. These symptoms only apply to the permanent set of teeth, according to Mr Hutchinson, who accounts for this by supposing that the temporary set suffer less uniformly than the permanent, because the occurrence of syphilitic stomatitis and its complication with alveolar periostitis to which the marring of the tooth is attributed, occurs during the first weeks of life, and when the temporary set of teeth are already well formed. Mr Hutchinson gives two very decisive cases in which, during syphilitic stomatitis in infants, inflammation of the alveolar periosteum accompanied by exfoliation of the teeth took place. These conditions of the teeth, which will be recognised by the dental profession as tallying very closely with what has been called atrophy of the teeth, are entirely distinct from caries, although such teeth are very liable to caries. The opinions brought forward by Mr Hutchinson, submitted to a committee of the Pathological Society of London, were in great measure confirmed by the committee. I look upon it that they may be accepted as representing in a very defined way, and from a very definite cause, a particular kind of dental disorder, though I would not agree with Mr Hutchinson, that a patient born syphilitic may escape from damage of the teeth altogether, if in infancy he escape stomatitis.

In cases of acquired syphilis, indeed, we often see not only a destruction of the teeth from exfoliation, but a residual effect on these organs creeping on assiduously, and manifesting itself at last in a manner as unexpected as it is serious.

We have yet to notice briefly the third class of poisons which, through the system, implicate the teeth. I spoke of these poisons as *malarious poisons*. That these poisons — or it were perhaps nearer the truth to say *this* poison, the evidence being in favour of a unit poison—acts only through the system is clear from the fact, that it produces general systemic symptoms of an intermittent kind, of which the tooth symptom is often but one, though it may be for the time the only symptom. How this poison finds its way into the system is a point of great obscurity. There is strong evidence that it floats in the air, and is inhaled by the lungs. There is strong evidence that it is sometimes carried by impure water, and is absorbed by the stomach. In its intensity of action it is confined to particular districts of the country—to marshy districts of country, of all others —where it lights up endemic disease. But in lesser intensity the poison lurks everywhere, setting up neuralgic affections, and tooth neuralgia perhaps most of all. Often when least suspected, this poison is doing its silent work, and teeth are not unfrequently sacrificed to its fury which in structure are as sound as unbroken enamel or dentine can make them. I remember some years ago being peculiarly impressed with this fact. In a village in which my professional labors were once exercised there was a small plot of ground covered with houses and little gardens. During

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one season I was constantly having under treatment some of the inhabitants of this locality for the toothache. I am afraid that, under pressure of solicitation and in ignorance of the cause that was at work, I drew more sound teeth than diseased ones for the people of this place. In the ordinary course of professional practice, the origin of the malady did not at first engage attention. At length an adult male inhabitant of the place came to me, not with toothache, but with brow ague. He remained under treatment some time, and, though relieved by quinine, did not recover. He went to one of the London Hospitals, and was very properly advised to try change of air. He took the change for a week, and had no sign of his disease. He returned home, and the disease at once returned to him. The same process was again repeated with the same results. On his after report of these facts to me, I was led to attribute this disease, and the recurring attacks of others in the locality, to some central and local cause. The cause once looked for was soon found, in the shape of a common, foul, and untrapped drain, the mouth of which was the open cloacæ for the district. The drain emptied and cleansed, all the cases of neuralgic pain disappeared.

From this we learn that the source of this poison may be quite local, that the poison requires constant renewal for the manifestation of its effects, and that the body once removed from the main source soon eliminates the poison from itself.

From those diseases of a constitutional nature which arise from poison introduced into the body and thence by secondary effect produce local diseases of the organs of mastication, we may turn to the second class of constitutional diseases which arise, as I have said, not from direct introduction of poison, but from some external or general cause hereditary or acquired, by which the physiological functions are deranged and health impaired. In this list of diseases are included certain states of body which are ordinarily grouped as *diatheses*, from the circumstance that they admit of arrangement under certain common heads and indicate at once a general disposition of one individual body to the development of one individual disorder. In this way we speak of the inflammatory diathesis, the strumous diathesis, the gouty diathesis, and the like. I shall consider such of these general dispositions as appear to give a constitutional basis to dental maladies.

The *strumous* or *scrofulous diathesis* has been treated of by most writers on dental surgery as one of the most common causes of caries, and the teeth of scrofulous persons have been specially described as small, of pearly whiteness, fragile, and ready to decay. In medical practice this disposition to dental mischief does not, however, come out so strikingly as might be supposed, nor do other diseases of the masticatory organs seem to the physician so simply dependant on struma as has been assumed. I doubt not that the practitioner of dentistry frequently

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meets with cases of strumous disease in which the teeth are specially implicated; the case therefore coming before him with all the marks of strumous disease prominent, he is led to connect the local disorder as an effect, to the strumous disorder as a cause. The physician, on the other hand, with his mind fixed on the general disorder, is often surprised to observe, amidst all the havoc which struma inflicts on its victims, how wonderfully the teeth escape. If we connect the disease phthisis pulmonaris with the strumous diathesis, the extent to which the teeth escape in the midst of surrounding evils is at once a remarkable and important fact. Amongst the numerous cases of consumptive disease which pass before me in an institution specially devoted to the treatment of that complaint, I do not remember a single instance in which there was any marked peculiarity; such as would specify a constitutional derangement, acting so as to affect the dental organism, either by caries, necrosis, or atrophy.

Yet there are two points relating to phthisis which deserve notice. When phthisis is fully developed, and that marked phenomenon of its presence, the intermittent hectic, shows itself, one symptom is often complained of as accompanying the attack—I mean a severe tooth neuralgia. The mention of this has led me often to examine the teeth of a phthisical patient, but such examination has rarely given a clue to the disease; indeed the pain is not concentrated in one tooth, but extends often to one side of the jaw altogether, and is not always in truth confined to the same side, but moves about, thus demonstrating its general origin. Large doses of quinine relieve this affection better than any other remedy, for the relief of which I have known teeth uselessly extracted.

In children of strumous habit, living in close unventilated rooms and subsisting on insufficient food, the soft parts surrounding the teeth are however very subject to ulceration, and the disease cancrum oris seems indeed to depend in great measure on the strumous diathesis, aided unquestionably by the external circumstances, and this ulceration extending deeply does indirectly involve the alveolar process, and so leads to disconnection and destruction of the teeth themselves. But here the tooth disorder is the indirect, and I had almost said accidental, result of a constitutional disease.

Those characteristic affections of the bones designated rachitis and mollities ossium, to which the children of strumous parents are so susceptible, might lead an observer given to compare analogies of structure with analogies of morbid structure to the belief that a connexion with the strumous diathesis with dental disease was common and sequential. But analogy fails equally in this case, a failure which the distinguished Hunter was first to point out. He observed that children and adults suffering from these disordered conditions of the bones rarely, if

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ever, showed any corresponding disorder in the dental structures. Curious though this circumstance may be, the experience of both physician and surgeon attests its reality. Our museums are filled with specimens of skeletons in every shape of disfigurement and destruction to which the osseous system is liable. But when the eye moves from the skeleton at large to its masticatory mechanism, the clear rows of firmly set teeth indicate how little these structures have shared with their neighbours in the almost universal malcondition.

Lastly, if there is any strumous disorder of active kind with which derangement of the teeth is an accompanying symptom, and with which such derangement seems to take part, it is that form of strumous disorder known as mesenteric disease. In these examples derangement of the digestive functions is a leading feature, and I have sometimes known struma as thus manifested, particularly in the young, accompanied with ulceration of the mouth, purulent deposit beneath the gum, and destruction of the tooth itself. But whether this disorder is primarily dependent on constitutional disposition, it is impossible to say, for the same state may obtain from other disorders involving the alimentary system.

There are also two other points of practice to be remembered in relation to the strumous diathesis, and the local maladies which are, or seem to be, engrafted on it. I mean, that strumous children are as liable as others to syphilitic taint; and, secondly, that strumous children, subject as they are in infancy to pulmonic affections of a low inflammatory type, are more liable to be subjected to the influence of mercurial treatment.

Further, the inheritor of the syphilitic taint or the acceptor of mercurial taint, feels the effects of these poisons the more the deeper he is tainted with the disease struma.

It would be necessary, consequently, in speaking of any variety of dental disorder as resting on the basis of a strumous diathesis, to eliminate, firstly, the possible influence of syphilis, and, secondly, the influence of mercury.

These eliminated, I opine from observation of the strumous manifestation, but without any attempt at dogmatism, that the strumous diathesis, *per se*, is not ordinarily a form of constitutional disorder from which dental diseases take their origin.

I would be inclined to urge the old rule, that of all the organic parts, the eliminative or glandular suffer most from struma, and to add, that of all the organic parts the organs of mastication suffer least.

At the same time, the fact is too obvious to be denied, that whenever certain abnormal states of the organs of mastication are developed by the agency of other causes, local or general, in so far as the strumous habit degrades nutrition, and suspends reparation of destroyed parts, in so far it favours the development of disease in the dental structures, favouring

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specially such affections as are of purulent character: ulceration of gum, purulent exfoliation of the alveolus, and abscess of the antrum maxillare.

I shall have occasion again to dwell on the dyspeptic, the gouty, and the rheumatic diatheses, in their relation to toothache and diseased dental structure. Meantime, certain general considerations on these points deserve place.

Common *dyspepsia*, unaccompanied by any specific diathesis, in so far as it may produce headache, and other so called nervous affections of a temporary nature, may, and does, produce a nervous pain in the teeth. But it has never appeared a demonstration to my mind that simple functional dyspepsia does ever, acting as a constitutional disease, give origin, except in very early youth, either to caries or to true inflammation of the dental pulp. It accords rather with my experience of simple dyspeptic toothache that when it occurs, it is confined to some tooth already advanced in caries, and to have been excited by a vitiated salival secretion—the upshot of the dyspeptic attack.

When therefore I see in practice dyspeptic symptoms, more or less permament, attended, as an apparent sequence, by pain in what seems to be a sound tooth; if the evidence inclines to symptoms of inflammation of the dental pulp; if destruction of tooth seems a sequence; or if purulent exudation beneath the gums seems a sequence, and these, any one, are traceable to the dyspepsia, independently of direct local cause, I am led to suspect that something more than dyspepsia is at work, that the dyspepsia itself is but a symptom of a more diffused malady. If the patient is young, I look for symptoms of syphilis or mesenteric disease, or inquire about mercury. If the patient is old, the syphilis and mercury may still be looked after, and something more—viz., *gout*.

It is the pleasure of gout to stand by the stomach. The stomach fathers it, and the stomach shows speedily by its own deficiencies the prodigal character of its offspring. The result is that we have set up in medicine for our observation a disease image with two heads, which we recognize as gouty dyspepsia.

A very clear knowledge must be possessed of the pathology of gout before its full influence in modifying the nutrition of the tooth can be understood. But this I must impress, that gout is often manifested in the tooth in its acute form; that in young men inclined to the gouty diathesis it often manifests itself first in the tooth; that it is capable of setting up its specific inflammation in the dental pulp; that the results of such inflammation are often attributed to local causes when the general one is at work doing the mischief.

The *rheumatic diathesis* has often been adduced as connected with different forms of dental malady, and as playing the constitutional half of those maladies. Rheumatic toothache is a common, though an indefinite term, used sometimes by medical

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men, occasionally by the people, but more rarely by members of the dental profession. The rheumatic diathesis in cases of rheumatic toothache is well marked in its characters, and is to be carefully isolated from the gouty diathesis, with which it has nothing in common save pain.

The rheumatic disease in its chronic or acute form has its affinity for fibrous structure. In its more insidious forms it creeps over nerve sheaths, diffuses through muscle, and works into the joints, thus realizing in its silent progressions neuralgia, muscular rheumatism, or flying rheumatism gnawing in the shoulder now and in the hip then.

In this way rheumatism moving about lights on tooth nerve, and gives the ache, of all others, most acute; a general ache with occasional stiffness in the muscles near; or sometimes rheumatism, still on his travels, takes the fibrous periosteum as his field ground, and supplies a pain—dull, heavy, diffuse—encircling the tooth, compressing it, and proving to the sufferer the existence of a tooth socket, without any reference either to the skeleton or anatomist's *vade mecum*.

But there is this peculiarity about these rheumatic affections, that although they may often recur, and constitute the severest aches, they leave but little behind in the way of organic change. Suppuration is not an effect, nor separation of tooth from its investment, nor injury to pulp, nor deposit of osseous matter, nor destruction of nutrition.

In its more severe forms the rheumatic disease, no longer creeping, lays sudden and violent grip on every limb, and thence, from the out-works to the citadel, carries the very heart by storm. Where there is fibrous structure there is rheumatism.

Yet there is an exception to this, which otherwise were a general rule. In the acute rheumatic arthritis the jaw and all its appendages are singularly and ordinarily saved. Call this a merciful provision in the midst of an unmerciful calamity if you will. I would prefer to say how remarkable in its pathological meaning is the fact, that generally, when the acute form of the rheumatic affection is most marked the patient seems as little susceptible to tooth affection as the healthiest member of the community.

The *cancerous diathesis*, or that condition in which the disposition to cancerous development is prominently marked, while it is in some measure removed from the study of simple dental diseases, is inseparably connected with the labours of those who practice dental surgery. In the tooth structure the cancer cell finds it may be no true point for development, but in all surrounding structures, in enclosing jaw, in soft parts and in neighbouring spongy bones, two varieties at least of the cancerous growth derived from the constitutional disposition, hereditary or acquired, manifest themselves; in their progress implicate the true dental organs, and in their growth, by interference with the

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nutrition of adjoining structures and with nerve supply, lead to symptoms of dental disease which abound freely in diagnostic difficulties.

There are two other obscure affections, both, as I think, neuralgic in type, and which seem to have a common constitutional cause. These are, the *toothache of pregnancy*, and *epidemic toothache.*

The toothache of pregnancy is generally confined to the first months of utero-gestation, is connected with other pains, and is often seated in a carious tooth.

The epidemic toothache is generally connected with catarrh, and also, though not always, with a tooth that is carious.

To sum up—

The following are the propositions which I would respectfully submit as expressing in a few words the relationships which exist between constitutional causes and dental diseases.

1. Dental diseases of whatever kind have two sources; a simple local source, and a constitutional source.
2. The diseases of the organs of mastication, arising purely from local causes, are limited in number; including caries, necrosis, inflammation or its upshot, and the ache, consequent upon exposure of nerve.
3. Every form of tooth disease may directly or indirectly originate in constitutional disorder, and some originate in no other ways.
4. In all such cases the true cause of the disease is external, and the system is merely the medium by which the cause passes, or through which it is carried to the locally diseased structure.
5. The causes acting on the teeth to produce diseases through the system, are of two kinds—chemical, as by introduction of poison into the body—and physiological, as by perversion of normal acts.
6. The inorganic poisons which through the system seem mostly to affect the teeth and adjacent parts, are mercury, the alkalies, and, perhaps, the malaria; the organic are the poisons of syphilis and small-pox.
7. *Mercury* produces caries, suppuration, and hæmorrhage from the gums; *syphilis*, atrophy, and tendency to caries; *small-pox*, suppuration, alveolar exfoliation and dental necrosis, and *malarial poison* intermittent tooth neuralgia.
8. Amongst the diatheses or dispositions of body affecting the teeth, the strumous, the dyspeptic, the gouty, the rheumatic, the cancerous, and the hæmorrhagic, are the most important.
9. The *strumous* diathesis, while it favours the development of all diseases of degenerative type, is not *per se*—*i.e.*, like syphilis or small-pox—a constitutional cause of dental disease. *Simple dyspepsia* is not a true constitutional

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cause. *Gout* is a true constitutional cause, leading both to acute ache and organic mischief; and *rheumatism* is a constitutional cause, giving rise to a specific rheumatic neuralgia of the tooth nerve and to a specific periostitis.

That there may be other forms of constitutional disorder arising from external causes, by which dental diseases are originated and intensified, is possible and probable. But modern science, carefully read, yields at present no more than I have inadequately marked out, except one, which has been intentionally omitted.

The *hæmorrhagic diathesis* as a constitutional malady, comes strictly under our present head. But this condition being one of peculiar import, must, as the novelists have it, be considered in a chapter of its own.

LECTURE II.

ON THE HÆMORRHAGIC DIATHESIS, IN ITS BEARINGS ON DENTAL PRACTICE.

[*Delivered November 16th*, 1858.]

MR PRESIDENT AND GENTLEMEN,

The subject before us for this evening's study, is entitled "The Hæmorrhagic Diathesis in its bearings on Dental Pratice."

I shall, in this lecture—for the purpose of being clearly understood by the younger members of the College, who may not have had the advantages of becoming practically conversant with anatomy and physiology—and specially with physiology—venture to move occasionally into the consideration of elementary principles and propositions.

It is the stamp of men of true knowledge that they learn and let learn, and learn again and again, never too often.

I know, therefore, I need not ask those who shall be conversant with every word I utter, to bear with me through the elementary teachings. I do not come here for the sake of display, but for the sake of instruction.

By the term Hæmorrhagic Diathesis is meant—

"A disposition to the effusion of blood."

It must be understood that the term is not applied to any individual disease; it is the expression rather of a symptom of disease, and it is a symptom which may belong to many diseases.

The Hæmorrhagic Diathesis may accompany the following common forms of disease:—

Scurvy, Purpura, Anæmia and its analogue Chlorosis, Dysentery, and Typhus.

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It may be connected, without any very prominent indications of any specific disorder, with simple derangements of health arising from certain pernicious habits—as profuse smoking—or the drinking of large quantities of water.

It may follow the introduction into the system of certain poisons as the alkalies or mercury.

In the majority of cases, whatever the primary cause may be, the hæmorrhagic diathesis is connected with, and is dependent on, a modification, chemical or physical, or both chemical and physical, in the blood and circulatory system. For the purpose, therefore, of properly teaching the origin of the Hæmorrhagic Diathesis, a brief description of the blood and circulation in their normal and in certain of their abnormal conditions, is absolutely required.

In its normal state the circulating blood is composed of a common fluid having water as the menstruum, in which are dissolved albumen, fibrine, and salts; this portion is called the liquor sanguinis.

Of a second portion, called the blood discs, of which there are two kinds—the red discs, or those which are most abundant, and which float in the centre of the stream, and the white, which are of larger size, very few in number, and which are ordinarily seen floating externally to the red column. Each of the separate parts of the blood has a special intention. The water is the menstruum; the albumen has a formative meaning —it is the raw material out of which what are called the nitrogenous tissues or structures are elaborated. The fibrine is probably a higher development of albumen, it is formative; out of it the muscular structures seem specially to be built. The saline matters are formative or eliminative. An alkaline body has for its purpose the holding of the fibrine in solution. The blood discs, those which are red, contain iron, and are the great agents by which the oxygen of the air is taken up and conveyed round the body. The uses of the white corpuscles are as yet not correctly determined.

When blood has been drawn and allowed to stand at rest and exposed, it undergoes a change which we call coagulation. It has lost a volatile alkaline principle, which in the body exerted a solvent effect on the fibrine. The blood in coagulation divides into two parts, called serum, as you see in this specimen; and into a jelly-looking mass, which is called crassa mentum or clot. The serum or watery part consists of the water, the albumen, and the salts; the clot consists of the fibrine and of the blood discs. The formation of the clot has been induced by the transition of the fibrine from the fluid to the solid state.

We prove this by two simple experiments—

1. If blood on being drawn is stirred with a rod, the fibrine adheres to it, forming a ropy mass; the fibrine may thus

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be separated, the blood corpuscles and the serum being left behind. After such separation no red coagulation takes place.

2. If to newly drawn blood any chemical substances of a fixed kind be added, which have the property of dissolving fibrine, the alkalies, potassa or soda for instance, no coagulation takes place.

In relation to the Hæmorrhagic Diathesis, this substance fibrine, from its many uses, holds the chief place. The uses of the fibrine indeed, independently of its formative intention, are many.

In the first place it gives to the blood a certain necessary degree of plasticity. Its use in this respect was ably defined many ages ago by Plato, who, in the 'Timæus,' describes "that throughout the blood there are diffused a number of fibres, which give to the fluid certain measures of tenuity and density, so that it may neither flow through the thin structures, nor from its density become unadapted to motion, and thus find a difficulty in flowing back by the veins." I could scarcely add or take from this simple physical observation of the greatest sage of antiquity; it expresses simply and justly the natural fact.

In the next place the fibrine is of curative value in certain accidents pertaining to the circulation in the healthy system. We have seen that when blood is drawn the fibrine separates into a clot. This is a provisional safeguard against hæmorrhage, when the circulatory system is opened at any part.

If I cut my finger, as the blood oozes forth, and enters into a new physical condition, the fibrine separates, the solid fibrine assists to close up or anneal the ends of the divided vessels, and the hæmorrhage ceases.

I have entered thus far into the description of the special properties of fibrine for the purpose of basing this fundamental proposition regarding the Hæmorrhagic Diathesis.

That whenever the hæmorrhagic diasthesis is present, the chief reason of its presence lies in the circumstance of some change in the fibrinous constituent.

Given a blood in which the properties of the fibrine, as regards quantity, diffusion or quality, are healthy, and the Hæmorrhagic Diathesis is impossible.

But the fibrine is liable to modification in all these particulars, and those modifications of it which lead to the hæmorrhagic tendency, are—

1. Deficiency.
2. Imperfect solubility.
3. Excessive solubility from the excess of a chemical solvent.

In fever there seems to be a real deficiency of fibrine. In scurvy, and in some forms of anœmia the fibrine is, or at least may be present, in normal quantity, but it is not properly dissolved and

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diffused through the blood. "The blood is not under the natural guardianship of the fibres." In yellow fever, and under the influences of several ordinary poisons—as antimony, mercury, and particularly the alkalies—the fibrine is unduly dissolved, is I believe chemically changed, and thus is incapable of undergoing, when the blood is liberated, the normal transition from liquidity to solidity above described.

Hence if under any one of these conditions the circulatory channels are opened, the blood which comes forth does not act as a safeguard to further hæmorrhage by the production of clot, but the hæmorrhage is continued and the Hæmorrhagic Diathesis is proved.

From these elementary remarks on the blood, let us briefly turn to the physical construction of the circulation.

The blood as it makes its continuous circuit through the body, bathing all parts and nourishing all parts, is in three conditions, it is as—

Venous blood, Arterial blood, Capillary blood.

As it is returning from all parts of the body to be poured into the right side of the heart, it is venous blood.

As it goes from the right side of the heart to the lungs, it is venous blood. As it streams by innumerable channels through the intimate vascular structure of the lungs it is capillary blood. As it returns to the left side of the heart revivified by the impress of the air received during its capillary stage in the lungs, it is arterial blood. As it hastens through the large conducting vessels to all parts of the body, it is arterial blood. As it passes by innumerable hair-like tubes through all the animal structures, it is capillary blood; and as it wears its way from capillaries on its return circuit, it becomes again venous blood.

Now, if the blood be healthy in character and the vessels healthy, this circuit is made, and these changes into all the varieties of blood are made, without exudation of blood itself at any part.

True, that during the circuit the arterial blood yields up in the capillary system those portions of itself which are required for the nourishment of the different parts; true that, by an exquisite law called the law of election, each part can select from the nutrient fluid pervading it such matter as its own structure demands; tooth can select the elements of tooth, gum the elements of gum, and so on. True that each part thus supplied with new structure from the arterial blood, can yield up also in the capillary circuit, those of its constituents which it no longer requires. True all this, and true that as regards the body at large, I mean in relation to all its parts and to the blood as a whole, there is a constant effusion and a perpetual restoration. But this is not hæmorrhage,—hæmorrhage being simply an effusion of blood *en masse* from one special structure.

According, then, to the part of the circuit in which the

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effusion takes place, the hæmorrhage assumes three types. It may be venous, it may be capillary, it may be arterial. If it is venous the current of blood is in a steady continuous stream; if it is capillary the effusion is passive, an oozing effusion, like the exudation of water from a sponge under gentle compression; if from an artery the effusion is in an intermittent current, it goes with the contraction of the heart.

An illustration of the first of these hæmorrhages is seen in the simple operation of venesection; of the second in the simpler act of drawing blood from the skin by needle puncture; of the third in the spouting hæmorrhage which occurs from divided arteries during the amputation of a limb.

I have already said that the true Hæmorrhagic Diathesis is set up from modification of blood, that the blood, unnaturally fluid, finds its way through the textures of the body. As a general rule when hæmorrhage occurs spontaneously during this state it is a capillary hæmorrhage. The blood, however fluid, does not filter through the coats of a vein or artery, but coming into the minute blood-vessels, finds its way through their more permeable structure. It is effused, as the saying goes. In this way, by this passive exudation, the petechial spot of typhus and the diffuse blotch of purpura are produced.

But there may be a local hæmorrhage of a passive kind, in which the blood itself is not at fault, but the local structure. In this case there is disease in the vessels of the part into which the blood is thrown, and the vessels, no longer able to sustain the column of blood sent through them by the propelling force of the circulation, give way and allow the escape of their contents.

Again, hæmorrhage from divided artery may occur from a want of contractile power in the vessel, and if the artery, though it be small, be out of the reach of the ligature, death may take place; for to ensure the spontaneous arrest of hæmorrhage from an artery, the coagulation of blood is not alone sufficient. The force propelling from behind tends greatly to keep up the flux. Now, however, another provision in normal states of body is made; the artery is furnished with a contractile force, and when an artery is divided, it does not at the divided end remain an open-mouthed tube, but contracts at this point, and mechanically aids in arresting the current which would otherwise escape.

In some diseased conditions of arteries, this contractile power is lost, and the hæmorrhage consequently is continued, until it is either stopped by the surgeon, or until the enfeebled heart fails to supply the current.

Once more there are cases of hæmorrhage from failure of arterial contraction due, not to want of contractile power purely, but to mechanical position of the bleeding vessel. Some arteries passing through bony canals have an external circumferential attachment to the bony wall surrounding them, and are thus prevented from contraction at such particular point. If, there-

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fore, in such canal division of vessel take place, the arrest of the hæmorrhage, spontaneously, is but partially provided for; the arrest can take place only by coagulation. Lastly, a powerfully acting heart may, and often does assist in sustaining, for a prolonged period, hæmorrhage from a divided vessel.

Thus hæmorrhage may arise from several sources, from extreme fluidity of blood, from local disease of blood-vessel, from want of contractile power in an artery, and from prevented contractile power in an artery: the first cause constitutes the true hæmorrhagic diathesis, the last or local causes may lead to symptoms which simulate the hæmorrhagic diathesis, and may be connected with it, but they do not belong to it *necessarily*.

In their relations to dental practice the hæmorrhagic diathesis, and hæmorrhage itself, are of importance in their bearings on three points.

1. In reference to passive hæmorrhage from the gums.
2. In reference to hæmorrhage from the gums after division by the knife.
3. In reference to hæmorrhage after tooth extraction.

Hæmorrhage from the dental structures, as a sequence of the hæmorrhagic diathesis, may occur during the presence of any of the disposing diseases on which the diathesis is based. It may occur in the course of extreme typhus; it may occur in extreme anæmia. It may occur from the effects of poisons, as from mercury or the alkalies; it occurs most frequently in dental practice, when dependent on diathesis from one of three diseases, scurvy, purpura, and anæmia.

True *scurvy*, as a disease, is not often seen in civil practice. It is the disease of improperly fed men under a central authority, which provides for them foolishly, or wisely, by system.

It was formerly the great disease of the navy, and now, at times, it breaks out in its worst forms in the men of our services, as the result of misfortune or ignorance in the commissariat department. The disease is marked by the presence of livid patechial blotches on the skin, arising, as we have seen, from effused blood; by great languor; by constant tendency to hæmorrhage; and, specially, by the scurvy gum. The gum is tumid, spongy, and ready at any moment to exude blood profusely. The most faithful description of scurvy and scurvy gum is given in the famous Essay of Dr Lind, who of all Esculapians may, I think, be considered to have most carefully studied this disease. After describing that the first symptom of this disease consists in a change of colour in the face, a greenish cast in the lips and eyes, lassitude and breathlessness, he adds—"The gums soon after become itchy, swell, and are apt to bleed upon the gentlest friction, the breath is then offensive, and upon looking into the mouth the gums appear of an unusual livid redness, are soft and spongy, and become afterwards extremely putrid and fungous: the pathognomic sign, perhaps, of the disease. They are subject not

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only to a bleeding from the gums, but prone to fall into hæmorrhages from other parts of the body."

The condition of the blood in this disease has been carefully studied, but contradictory statements have been made as to the amount of fibrine. It seems clear that in many analyses of scurvy blood the fibrine is not deficient in amount, and that in some cases there is even an excess of fibrine. At the same time it is admitted that the coagulating power of the blood is low; and that transudation of blood from the tissues is easy all the symptoms demonstrate.

In so far as I am able to ascertain, the fibrine is present in scurvy blood, but is in an imperfect state of solution. It is not diffused through the fluid in such way as to give an uniform plasticity and density. Some of the old writers describe, in fact, that in drawing blood in scurvy, the blood stream is of two colours, dark and white—the dark stream being blood destitute of fibrine, the white stream the separated fibrine. The fluid effused into the tissues in scurvy is uncoagulable, and shows no tendency to enter into new organisation.

In this description of scurvy, I have given the history of what is called true scurvy or sea-scurvy, to distinguish it from another disease called *purpura* or *land-scurvy*. This latter disease is the one which to men in ordinary practice gives most trouble as a cause of hæmorrhage, and it is this disease which, more than all others, is connected with the hæmorrhagic diathesis. In all its leading traits the disease resembles sea-scurvy, and such points of difference as have been described by different authors are, as Lind and Huxham long since pointed out, differences of degree rather than kind. I do not think that at one age of life there is more liability to purpura than at another. I have seen the disease in infants, children, adults, persons of middle age, and persons advanced in life. Under proper treatment, it is ordinarily curable. It attacks women and men equally. It is characterised by the one great feature, a tendency to effusion of blood. The blood is effused into the soft structures, or often is poured out direct in full current, from the nose for instance, or from the bowels. A prick in the skin may be followed by profuse hæmorrhage, and a small operation may be attended, especially if an artery is divided, by serious results. The difficulty of arresting hæmorrhage from an artery in these cases is moreover increased by the circumstance that the contraction of the arterial coat is reduced in force. The blood in these cases is not always deficient in fibrine, but, as in scurvy, the fibrine is not in a proper state of solution; indeed, in one case that I saw, where death took place, the fatal result was not due to hæmorrhage but to deposit of fibrine in the right chambers of the heart.

It has been urged by some writers that this disorder depends on hereditary transmission, and you will find authorities who speak in support of this view, stating its occurrence as extending to all members of one family. In the cases of purpura which I

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have witnessed, I have never found any observations to support this fact, and it seems to me that the occurrence of the disease in many members of a family at the same time depends rather on the circumstance that the members of the family affected are all living under the same faulty hygienic condition, and are consequently affected in a similar way.

It has been laid down again by some, that in purpura the gums are not ordinarily affected, and it has even been suggested that this immunity of the gum may be accepted as a diagnostic mark, distinguishing this disease from its ally the sea-scurvy. For my part, I hold that such differential diagnosis is quite untenable. It is true that the gum is not always so markedly affected as in the cases of sea-scurvy described by Dr Lind. But I have never seen a case of purpura in which the gums were not vascular, spongy, and dark-coloured. In one instance which I recently had under notice, the patient suffered from active hæmorrhage from no structures except the gums. It is, in fact, this class of case which ordinarily comes before the dental practitioner in the form of spongy, bleeding gum. Further, it sometimes happens that the gum is the only structure in which, in mild cases, the tendency to effusion and hæmorrhage is present, and it is in such cases specially that dangerous hæmorrhage takes place after tooth extraction, and after incision of the gums during the first dentition.

In some extreme forms of *anæmia*, hæmorrhage of a persistent kind may occur in the gums from very slight causes. In this disease, anæmia, the symptoms partake of lassitude, rapid circulation, and a peculiar bloodlessness of the skin, which marks the complaint as effectually as the dark spot marks scurvy or purpura. The blood differs from that of purpura in certain respects, and resembles it in others; resembles it in its fluidity, and in its tendency to escape from an open wound; resembles it also sometimes in the circumstance that the fibrine is held in inefficient solution. But anæmic blood differs from purpuric blood in that it is deficient in the red corpuscles, or at all events in the colouring principle which is inclosed in those corpuscles. Hence, if effusion take place in anæmia into the soft structures, it is not a dark, livid spot which is produced, but a simple dropsical condition. In anæmia, consequently, there is none of that livid swelling in the gum structures which accompanies scurvy, nor is there exudation of blood from those structures. But this occurs in common, that if the gums are subjected to incision, or if the arterial trunk feeding a tooth is torn across, the fluid blood possessed of but feeble coagulating power, and the vascular trunk possessed of but feeble contractile power, hæmorrhage is the result, and that hæmorrhage may even be more formidable than in purpura. For in anæmia all the forces of life are low, and the heart which beats so quickly is only making up in rapidity that which it cannot give in power.

I do not think many cases of fatal hæmorrhage from tooth ex-

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traction during extreme anæmic condition have occurred, for the face of the patient is a sufficient forewarning, and the operator hesitates before he commences his task. But in children of anæmic cast during the first dentition, the teething is often prolonged and extremely painful, and the surgeon is led at some risk to use the lancet. I have had two or three very painful lessons in cases of this description. In one, the gums of an anæmic child were freely incised over four presenting teeth. The operation was cleanly done, and the operator (for it was in country practice) went on his rounds, not dreaming of having inflicted any mischief. But scarcely had he left when hæmorrhage, profuse and continuous, set in, and in an hour, and before assistance could be obtained, death was the result.

I once myself in dispensary practice incised the gums of an anæmic child without anticipating any serious results. I was mistaken. Fortunately the mother returned to me with the babe on account of the hæmorrhage. She was in time certainly, but that is all that can be said, for the syncope and long remaining exhaustion told too clearly how nearly a fatal act had been achieved.

But if in anæmic cases, hæmorrhage from the use of the knife is to be feared, such event is even more to be dreaded from the application of leeches to the soft structures of the mouth. I will explain, by reference to experiment, why this is the case. It had long been known that after the leech bite, hæmorrhage is more difficult to check than after an incised wound of the same size. It had been observed that in cases where the hæmorragic diathesis is marked, loss of blood, even to the destruction of life, may occur from leech bite. On investigating the effect of the leech bite experimentally I discovered one or two facts which show why the bite is specially dangerous. I found, first, that the blood drawn into the body of a leech loses its coagulating power; and, further, I found that when a leech is applied to a *healthy* person, a certain definite period is required, after the removal of the leech, before the blood which continues to flow through the wound possesses the power of coagulation.

Thus the blood which is caught directly after the leech is withdrawn will not coagulate at all. Blood received five minutes later requires twenty-five minutes to coagulate. Blood collected ten minutes later still requires eight minutes to coagulate, and a full half hour is required before blood regains its ordinary period of coagulation.

The explanation of the continued flow from the leech bite is, I believe, supplied in the fact that the leech, while drawing, secretes from its body and impregnates the wound with a fluid which has the property of arresting coagulation.

My object in introducing this special subject is to prepare the junior dental practitioner for the risks that may be incurred from the application of leeches to the gums during states when

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the hæmorrhagic diathesis, whether manifested in scurvy, purpura, or anæmia, presents itself. For as the leech bite sets up a sustained hæmorrhage in the healthy man, as I have shown, it is hardly necessary to impress that during the hæmorrhagic tendency the effect and its consequences are vastly increased. At least five times in my professional career I have had the task of suppressing dangerous leech hæmorrhage from gums to which, without either rhyme or reason, a leech had been empirically applied.

There is an anæmic condition sometimes present, which is accompanied with ulceration of the mouth and tongue, and with purulent affection of the gums. This condition is met with in cancrum oris, and may be said to constitute that disease as it is seen in the half-fed children of our half-starved population. In this condition, the teeth become involved, and extraction is solicited. I presume that, in the majority of these cases, hæmorrhage of a dangerous kind is not common; but I have seen it troublesome. The hæmorrhage, however, is chiefly from the gum, not from the artery supplying the tooth.

In that injected and spongy condition of gum which results from mercurial poisoning, the gum, as in scurvy, is swollen and livid, and gives out blood readily on the smallest injury. Mercury in fact produces a kind of scurvy, but with less demonstration of the hæmorrhagic tendency. I have never seen dangerous hæmorrhage from the dental structures during mercurial poisoning, but I have seen a passive and annoying congestion of very prolonged character, and giving rise to frequent but small exudations of blood on the slightest provocation.

In this class of cases, too, the practitioner is liable to be deceived as to the cause of the hæmorrhagic tendency, from the real or assumed ignorance of the patient. The patient is taking a mild mercurial course, or has taken it, and when the gums become troublesome, and he finds that they do not recover their tone on the mere cessation of the drug, he is fain to seek advice and to suppress the fact of cause. Or the patient is engaged at some occupation in which mercury is used, and goes on long suffering without any certain knowledge as to the agency at work in the production of his symptoms.

A man came before me one day suffering from slight hæmoptysis, and supposed phthisis. The breath being very offensive, I was led to examine the throat internally, under the suspicion that there was ulceration in the fauces. But the mischief was in the gums. You are taking mercury, I said. He protested not. To his knowledge he had never taken mercury in all his life; but he had suffered at periods from the same tenderness of gums and tendency to hæmorrhage for years. I sought about the body for patches of purpura, but found none. Convinced that the long symptoms and mischief of gum had a common origin, and were both the expression of a central cause, I made further enquiries on

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his next visit, and with success. The man was occupied as an under hand in a gilding business. The old mercurial process under some modified and less open name was followed by his employer, and I learnt, on deeper enquiry still, that not only my patient, but several other workmen, had been the ignorant sufferers from this absurd, and I may say, cruel form of artistic industry.

In these outlines I have given the leading characteristics of those affections of the dental structures which depend npon the hæmorrhagic diathesis as the accompaniment of certain predisposing systemic disorders. Whenever there is a tendency to passive or active hæmorrhage from the gums, there is, as will I hope have been gathered, always a probability of the diathesis and of one or other of the diseases upon which it is based. In some cases of this kind, however, and in many cases of profuse hæmorrhage after tooth extraction, this diathesis is also present, and may be set down as the chief cause of the hæmorrhage.

I must quote an illustration of this form of hæmorrhage. It is, perhaps, the best illustration on record of a fatal case. The author I quote from, Mr W. A. Roberts, of Edinburgh, was the operator, and his history of the facts will be found in full in the 'Medical Gazette' for 1841. A Mr Pen, a man of middle age, and rather full in body, called on Mr Roberts on the 19th of December, 1841, and had a loose wisdom tooth removed from the right side of the lower jaw. The tooth had three small fangs, the anterior one being the longest; the hæmorrhage, not more than usual, stopped before the patient left the house; the alveolus being plugged with lint, wetted with camphorated spirit of wine. At half-past four of the same day Mr Pen called again on Mr Roberts, the blood flowing in full stream from the alveolus. Plugging with lint and firm pressure with a cork was now adopted, with stringent lotions, and the hæmorrhage was stopped, the saliva coming away unstained. At this visit the patient informed Mr Roberts that he had had a tooth taken out a few years before, which was followed by considerable bleeding for nearly three days, but was arrested by the application of caustic; and also that his gums lately had bled to a great extent, and for a fortnight at a time. On Monday morning, Mr Roberts was sent for, and found that the bleeding had continued all night. There was *no coagulum* in the alveolus, or in the blood which was spat out. A portion of caustic was now put down to the bottom of the alveolus, pressure applied over it, and lotions of kino and alum were used with benefit. For an hour all appeared safe. In the course of the day Dr Hay was called in, and finding the hæmorrhage still present, applied the actual cautery without benefit. Afterwards, with an iron better adapted, Mr Roberts used the actual cautery, but with no better result. In using the iron the patient started, and the under lip was slightly burned. From the wound thus produced, blood oozed freely for several days. Success was vain until Wednesday, when the hæmorrhage

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was more severe, and symptoms of syncope were manifest. Towards evening an improvement took place, the bleeding being under command by pressure. Mild purgatives were given in consequence of a considerable quantity of blood having been swallowed. On Thursday, there was sinking, and, although the hæmorrhage from the tooth had stopped, there was hæmorrhage from the gums and left nostril. From this time, however, till the 31st of December, improvement took place, when suddenly there was a change for the worse; there was slight hæmorrhage from the nostril gums, and alveolus, which continued. The gums were very turgid, of purple colour, and almost covered the teeth, the features collapsed, the cheek was discoloured, and all the symptoms of purpura hæmorrhagica were decided. Dr Abercromby and Mr Nasmyth were consulted, and Mr Nasmyth once touched the gums with protonitrate of mercury, but only to check the hæmorrhage for a short time. Death put an end to this painfully interesting case on Tuesday, three weeks and two days after the operation.

While, then, in the hæmorrhagic diathesis we may look for an explanation of cause in the majority of instances of hæmorrhages, and, perhaps, always in the worst cases, it must be admitted and specially remembered that there are other classes of cases in which severe hæmorrhage, active as well as passive, may have a local origin, and stand independently altogether of systemic cause.

Hæmorrhage from the gums may thus occnr in robust people, whose blood has full coagulating power, from exfoliation of the alveolus, purulent deposit, or any local cause by which the texture of the gum is injured and its vessels reduced in tone.

In like manner vascular growths in or about the gum structure may, without any connection with the hæmorrhagic tendency, give rise to passive hæmorrhage.

But above all it must be remembered, that after tooth extraction, hæmorrhage may be present, and may lead to imminent danger, and yet the diathesis shall not be at all marked out—shall not, in point of fact, be there. In such cases the flowing blood shall be possessed of the most complete coagulating power, a circumstance which alone would remove the notion of diathesis from the field, while the general symptoms of the patient shall convey no cause for belief in the presence of any of those diseases upon which the tendency to hæmorrhage from impairment of blood exists.

One of the best illustrations on record of this variety of hæmorrhage after extraction is recorded in the 'Medical Gazette' for 1842, by Mr Davenport, of Eltham, in Kent. On the 27th of February, of that year, at half-past seven, a.m., a young healthy man, aged twenty-three, requested Mr Davenport to remove a molar tooth from the lower jaw that had given considerable pain for some weeks. The tooth came out without difficulty, and

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perfectly clean. The patient returned home, a short distance off, to breakfast, and made a hearty meal. At four o'clock, p.m., he called on Mr Davenport, and stated that hæmorrhage had come on two hours after the extraction, and had continued ever since On examining the socket, Mr Davenport found in it large clots of blood, which he removed, plugging the cavity immediately afterwards with lint dipped in a solution of alum and zinc, and securing the whole with a piece of cork, pressing firmly into the socket, the upper jaw resting upon it. Two hours later the hæmorrhage was going on as usual, rapidly. Mr Davenport again removed the plugs, and dividing a portion of fine wadding into very small pieces, dipped the pieces one by one in the solution of alum and zinc, and pressed them to the bottom of the socket, thinking, though he had plugged tightly before, that he had not pressed on the extreme point of the socket whence the hæmorrhage proceeded; the cork was firmly placed as before. Two hours later there was no alteration. Mr Davenport now removed the cork, and made firm pressure over the plug of lint with his finger for half-an-hour, which act appeared to arrest the hæmorrhage for a time, but on removing the pressure the flow returned again. Mr Davenport next removed the plug and restopped firmly with lint, dipping the lint in a solution of alum and kino. Alum in solution was also directed to be held in the mouth. At ten in the evening the hæmorrhage seemed to have ceased, the solution coming from the mouth quite colourless. The bleeding returned very shortly after, and at half-past seven on the following morning Mr Davenport was informed that the father of the patient had been trying a remedy of his own, by filling the cavity of the tooth with resin very finely powdered, and by pressing down with lint; the flux had then ceased for two hours and a-half, when, in the act of coughing, it came on as bad as ever, and continued till the evening. On examining the cavity large clots were found to have formed round the plugs, and had nearly filled the mouth; and Mr Davenport states his extreme surprise that such firm coagula "almost as solid as liver," did not check the hæmorrhage; the blood still flowed from the alveolus. Again the plug and coagula were removed, and alum, deprived of its water of crystallization, was tried without further benefit. Then caustic in shape of a caustic point was carried down to the bottom of the socket, the plug being afterwards inserted, but with no effect. At three o'clock of the second day the symptoms were truly alarming, for more than seven pints of blood had been lost. At six o'clock a portion of the fungus called Licoperdon giganteum, or common puff ball, a common remedy in such instances, was applied, but proved of no avail. Mr Davenput now felt that if something more could not be done death must occur from exhaustion in a few hours. Assistance was sent for from town, Mr Thomson, of Grosvenor street, being called; but at eight o'clock, thirty-four hours after the extraction,

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while Mr Davenport was about to use the actual cautery, the patient suddenly became sick and very faint, and brought up a large quantity of clotted blood, after which the hemorrhage entirely stopped and returned no more. The patient ultimately did well.

There have been several cases something after these recorded, and cases in which the actual cautery has been used and the carotid tied without any result. But out of the whole, I have selected the above as representing these three points better than any other. First, fatal hæmorrhage due to hæmorrhagic diathesis. Secondly, hæmorrhage taking place with firmly coagulating blood—*i. e.* in the absence of the hæmorrhagic diathesis. Thirdly, a process of natural cure which sometimes occurs in the last named cases, concerning which I shall have a word further on.

I was once consulted in a case in many respects identical with the case last described. A man of healthy habit, employed in out-door work, and who in his own phraseology "had never been laid up since he had the measles," had a lower molar tooth extracted for him by a druggist. From the moment of extraction the hæmorrhage commenced and continued. The operator plugged the socket, and for four days and a half he, the operator, was in attendance pursuing every course which he thought most conducive to arrest hæmorrhage. Alum, benzoin, tannin, spider-web, and a variety of other things were tried, but with no avail. After four days, the patient's symptoms became so alarming that his friends, some of whom had been under my care, brought him to me. He was now exhausted and completely blanched, the blood flowing more freely than ever. I looked on the case certainly with anxiety—for in instances where hæmorrhage is so prolonged, the blood is deteriorated from the mere loss of it, its volume in the circulation being filled by the water from the tissues; but catching a little of this blood in a spoon, I found that coagulation occurred in four minutes, which, at the temperature of the day, 54° Faht. was fair as an average time for coagulation. I also learned that, throughout, the blood had uniformly clotted freely, and these facts, taken with the history of the man's life previously, pointed satisfactorily to this diagnosis, always important in such instances, that the hæmorrhage was purely accidental, and disconnected altogether from any pre-existing taint. Removing, then, the clots of blood from the socket, and washing the socket out by the syringe with water, as hot as could be borne, to which a few minims of nitric acid had been added, I next plugged layer upon layer, and very firmly, with lint dipped in solution of nitric acid, at the strength of one of acid and one of water. Pressure was applied, but was not required for long—as the hæmorrhage ceased, and did not return.

Now, without giving any further illustration of these serious

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cases, the question arises—upon what does the hæmorrhage depend? It is clear that in the two last-named cases it did not depend on any diathetic feebleness of blood. This theory, therefore, in these cases may be excluded.

We are then narrowed down to local causes—and these, indeed, cannot be many. There can, in short, be only one real cause, viz., want of contractile act in the vessel. Here our physiological knowledge, it will be seen, throws in all its light as to the cause of hæmorrhage. And this one cause upon what does it depend? Why does not the vessel close on the blood column. Is the failure from actual want of tone in the vessel? Is the vessel diseased? It may be, certainly—but this I take it is not commonly the case; the rule being general, that, cæteris paribus, when there is healthy coagulation of blood and a healthy body there are healthy blood-vessels.

Is it that the artery is rudely torn; i.e.—is it from a bungling operation? I have heard this explanation given, but I cannot acknowledge it; for physiology teaches that an artery divided by a clean cut will bleed, and that an artery divided by a jagged and twisting tear will not bleed. If a Liston, with keen knife and keener skill, should cut off a limb, and should not tie arteries; from the masterly-cut vessels the patient would bleed to his doom. But if a man shall put his arm into the revolving wheels of a great machine, the ruthless wheels, tearing the limb away and applying it to what purposes they wot, will leave behind unartistically divided arteries, which will seal up at once, so that the arm only dies while the man lives. We may therefore exclude the tear as the cause. Is there then no explanation of the hæmorrhage? there must be; and this seems to me the most probable. That in some instances there is a union of a circumferential kind between the arterial trunk and its surrounding bony structure—which union prevents contraction, and enables the heart to pour out through the open floodgate its red current, the spring of life.

In these examples a powerfully acting heart adds to the danger.

Here then, in brief, are the circumstances in which hæmorrhage from the dental structures may occur.

It may occur—

PASSIVELY—As by exudation through the thin structures, during extreme fluid states of blood,—or by transudation of healthy blood through injured vessel.

ACTIVELY—from divided and feebly contractile vessels during fluid states of blood.

" Or by escape of healthy blood from vessels in which the contractile force is prevented.

The recollection of these divisions will guide us well in our next subject,—the matter of treatment, whether preventive or curative.

As the preventive is always the first proper element in treat-

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ment, it should be first enforced; and these are its principles in reference to those cases in which there is a pre-existing diathesis to loss of blood.

Whenever the diathesis is marked, on whatever disease it is based,—whether on purpura, or anemia—operations on the teeth and gums should, as far as is possible, be studiously avoided.

In such cases, indeed, operative interference, when asked for, is often not required; the symptom for which it was solicited will go away more quickly under more kindly influences.

Whenever the diathesis is well marked, it will generally be found to have some external cause. If purpura bases the diathesis, it will be found to have its rise in some irregularity of diet. I do not believe that a salted diet is the one thing necessary for the production of the purpuric condition; but rather that one particular form of diet, from which, generally, fruits are expunged, is taken in preference to that variety of food which the bountiful hand of nature holds out for the acceptance of her children. Here then in this development of the diathesis, while fresh air and sunny baths must not be omitted beneath the adjuration to Apollo, the diet must be the first care; lemons and the golden fruit of the Hesperides being the great remedies.

In such ordinary cases of scurvy gum as come before us in civil practice, if the disease is seen in moderate time, and the teeth are not removed from extension of mischief through the periosteum, recovery will ordinarily take place under the change of diet indicated, cleanliness, and healthful exercise.

If medicine must be given in this disease, and it often must in bad cases, two medicinal remedies claim special attention. Turpentine is one, and the tincture of muriate of iron is another. The two remedies seem to have very different properties; but in the purpuric disease their effects are one and the same.

If the patient is above ten years old either remedy is given ordinarily in ten minim doses, three times a day. Below ten years, a drop is reduced for each year. I do not know, after equal trial, which of these remedies is best. They are both excellent. Under their use, the blood regains its normal plasticity, and the structures their solidity. An aperient is occasionally demanded.

If local applications are used they cannot be too simple. Simple alum water as a wash is perhaps, after all, the best. If teeth are loose at the beginning of the attack, and have not lost their emanel, they are better left,—they will refix and repair.

In the anæmic condition upon which, as we have seen, the tendency to hæmorrhage sometimes rests, the anæmia will be found ordinarily to depend upon impure air rather than improper food. A person would become anæmic upon the best cheer ever set on Royal table, if he ate it in a cellar and lived in his dining-room. Fresh air, sunlight, and exercise are the remedies here. If the patient tells you he has all these necessaries, then you may look for some other cause, still however connected with the air

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respired. I will tell you of one cause—that is excessive smoking. I do not think moderate smoking does harm, but immoderate smoking does every harm, and specially in producing a dissolved condition of blood. I once submitted the blood of a confirmed smoker to examination, generally and microscopically. In the morning, when the fumes were *off*, the blood drawn from his hand coagulated with moderate firmness, was of red colour, and the red corpuscles were clearly defined. At mid-day, when the fumes were *on*, these conditions were all modified; at midnight, when the fumes of twenty-five pipes had done their worst, the blood drawn was of dirty hue and uncoagulable, while the corpuscles floating in a liquor of unnatural density assumed every variety of outline.

The cause of this change is easily given; with the smoke of the weed there ascends an alkaline principle, an ammonia. Blow the smoke of tobacco in one whiff over a glass plate moistened with hydrochloric acid, and on drying your plate it is frosted with sal-ammoniac. Need I connect the effects of profuse inhalation of ammonia with the case of the maniac described from Dr Huxham in last lecture, or show at greater length the existing analogy?

In anæmic cases, then, it is the first business of the medical man to remove the external cause; and having done this, to bring into full swing one important medicine—I mean iron. In the hæmorrhagic diathesis depending on anemia, turpentine must not be thought of; but iron—and of all forms and preparations of iron, for all ages of life, the carbonate is the best. Of this form, ten grains to twenty, three times daily, may be given to persons over ten years old.

In cases of the mercurial hæmorrhagic gum, the preventive step is to stay the further introduction of the poison, and to remove from the system that which is there. By an eliminative power possessed apparently by no other drug, iodide of potassium is the remedy for this form of disorder. It is given in from three to five-grain doses, three times daily, in any simple menstruum. Locally, in the treatment of this affection, simple alum solution washes are best.

In that variety of passive hæmorrhage which results entirely from local mischief, as from the presence of dead bone, the removal of the cause is the common-sense treatment.

In cases of active hæmorrhage from the dental structures, the result of operation, the rapidity of the symptoms forbid the consideration of any but the most active treatment.

I think, however, that too much exclusion has been often practised in these cases; and that in many of the fatal instances where death has occurred after three or four days, or even weeks of hæmorrhage, that while too much care has certainly not been bestowed on the local treatment, too little has been thought of in relation to general or systemic treatment. I would therefore suggest, I believe for the first time, that in cases of hæmorrhage

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of the kind I am describing, the internal administration of acids should be from the first considered. I will show the force of this recommendation. There is a form of hæmorrhage called hæmoptysis. In this case, as in the case of hæmorrhage from a tooth, the current of blood comes from a divided artery. Here, however, the divided vessel is in the lung, and out of reach, and if the physician, feeling the impossibility of local treatment, were to put his hands in his pocket, his patient would die much sooner than from any loss of blood from a dental artery. Yet in vast numbers of cases, the patient is saved in hæmoptysis by the physician. How? By the simple administration of the mineral acids, or of acetate of lead. The effect here is through the system, but in its ultimate results it is localized, or local.

In prolonged hæmorrhages from the dental vessels, especially if such hæmorrhage depends on the hæmorrhagic diathesis, do not, then, while trying the local means about to be given, forget how the physician stops, aye, and rapidly stops, hæmoptysis.

Give the internal styptic. You may administer dilute sulphuric acid in infusion of roses in proportion of ten minims to the ounce, every four hours. You may give the acetate of lead if you have any preference for it (and you should have a preference for it if the action of the heart is rapid), in two-grain doses every two hours.

In the case which I have recorded from Mr Roberts, a grand element in the treatment, from the first, would have been the internal administration of mineral acids, or of mineral acid with iron. A change in the constitution and character of the whole blood was required. I would not for a moment be understood as saying this critically; I refer again to the case simply to fix more firmly on the mind the treatment which in another and analogous case should not be overlooked.

For the local treatment of hæmorrhage from tooth extraction, a variety of plans have been suggested.

If the blood possesses good coagulating power, I do not think that any man of cool nerve could let a patient die. I will take a case of extreme kind, however, for illustration of treatment. Imagine for yourselves a case of extreme fluidity of blood, attended with want of contractile force in the vessel divided.

In such case, then, you require to have in your ready mind three remedies.

1. *A good styptic*—that is to say, an agent which by its action on blood will produce the speediest coagulation.
2. A good plug.
3. A means of applying firm pressure.

Now, about styptics I can tell you something, for I believe I have tested every substance that has been brought out as a styptic. Styptics act in three ways, some act chemically—that is to say, by precipitating the fibrin—and of these the best are the sulphuric, nitric, and hydro-chloric acids, and tannin. Others act

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physically—that is to say, the blood as it gushes through the parts of which the solid styptic is composed, yields up its fibrin in the meshes. Such styptics are spider's web, common puff-ball, and matico. Lastly, others act in both ways—*i.e.*, they produce coagulation of blood and contraction of blood-vessel at one and the same time. The actual cautery is a styptic of this class, and is, therefore, the most powerful styptic known.

For stopping the hæmorrhage from a tooth, a chemical styptic is the best, and taking it all in all the nitric acid is on the blood of all animals the styptic most powerful. This acid, in extreme cases, may be applied on a pledget of lint direct to a bleeding vessel. I should really waste your time were I to enumerate the virtues of other styptics, for this combines the styptic properties of them all in the highest degree, and has no disadvantages as far as I know.

2. As regards the plug. If the extracted tooth is at hand, and the fangs are unbroken, I think that the suggestion of Mr Archibald Blacklock is the best, if it can be conveniently done; that, viz., of reinserting this extracted member. But I should suggest that before doing so the cavity of the tooth, emptied of its contained blood, should be injected with a weak solution of nitric acid. If the tooth cannot be used as a plug, and lint has to be applied, the lint should be used as it was in Mr Davenport's case, and in the way that has been suggested by Professor Bell—viz., the lint should be applied, layer by layer, until the cavity is filled. The lower layers, or all of them, being saturated in the styptic solution employed.*

3. As regards pressure. This must be continued; and a variety of means have been adopted for sustaining the direct force. Every advantage in this respect is, I think, secured by the simple and effective invention of Dr Reid, now before the Society. In this instrument, a plate arranged so as to secure pressure between the jaw and some contiguous part, is fitted with a sliding screw, which can be adjusted to any cavity in the jaw, and can be made to exert pressure upon any plug. By a proper application of these simple local measures, coupled with general treatment, in the administration of the mineral acids or of lead, I cannot but believe that all cases of hæmorrhage are under control.

There is another point, of a general kind, which must always be recalled. It is this: remember that hæmorrhage feeds, if I may use the expression, on itself. Remember that so long as hæmorrhage lasts, so long the resupply of fluid into the exhausted circulatory canals is derived from the watery matter of the tissues. On this remembrance base this line of practice;

* Mr Roberts, of Edinburgh, in a letter to the 'Medical Gazette' in 1842, states that a friend of his, in a case of severe hæmorrhage after extraction, filled the bleeding cavity with plaster of Paris, and thus effectually checked the current. The experiment deserves to be remembered.

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that whenever a patient leaves your hands, in whom tendency to hæmorrhage after extraction is obvious, you impress on him to inform you of the merest tendency to return of the flux. Patients are often ignorantly careless on this regard. They expect the hæmorrhage will stop, and that time will cure. You know that time will perpetuate, and you should instruct them to that effect. Mr Roberts very correctly laments that his patient, contrary to orders, let the bleeding go on all night, hoping that it would stop. If in that distressing case there was one circumstance which more than another turned, in the balance of life and death, the death scale, it was that vain hope of Mr Pen that the hæmorrhage would cease of itself if he tarried patiently.

For the special benefit of those to whom this lecture is addressed, I would, that its precepts may be left more fully on the mind, condense into a few passages the salient points.

1. The hæmorrhagic diathesis means, a disposition to effusion of blood; such effusion being called passive effusion when the blood infiltrates into or through a soft structure as the gum, and active when it is effused direct through an open vessel.

2. The diathesis is based upon some pre-existent disease, such as scurvy, purpura, or anæmia; or upon a poison, of which mercury is the best representative.

3. There may be both active and passive hæmorrhage without pre-existent diathesis: as from local disease, or local injury in the circulating machinery.

4. When hæmorrhage depends on the hæmorrhagic diathesis, the peculiarity of blood is due to modification in the fibrinous constituent, including either a deficiency of fibrin, imperfect solution, or excessive solution, to which may be added deficiency of contractile power in the blood-vessels.

5. When hæmorrhage occurs in the absence of the diathesis, it is either from disease of vessel, or from the contractility of a divided vessel being suspended as a result of connexion of the vessel, circumferentially, with an unyielding structure.

6. The treatment of passive hæmorrhage from the dental structures is general in kind, consisting in the removal of the external cause, in the re-invigoration of the body by the administration of medicines of the styptic and tonic class; or in the elimination of a poison, if a poison is the disposing agent.

7. The treatment of passive hæmorrhage from the gums, due to a local cause, as a necrosed tooth, or portion of exfoliated bone, consists simply in removal of the cause.

Lastly. In active hæmorrhage after tooth extraction, the points of practice to be borne in mind are (a) The adoption of a general treatment by the adminstration of styptic remedies. (b) The selection of a good chemical styptic, nitric acid being the best. (c) The selection of a good plug. (d) The application of a firm and continuous pressure.

[END OF LECTURE II.]

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LECTURE III.

NEURALGIA IN RELATION TO TOOTHACHE AND DISEASES OF THE TEETH.

Mr President and Gentlemen,

The text of our present Lecture is "Neuralgia in relation to Toothache and Diseases of the Teeth." The subject is a wide one, and one on which much discursive writing and speaking has been expended.

I shall do my best on this occasion to collate reliable facts, and to place such practical information as the facts may teach on a physiological basis. For thus taught Harvey:

"The physiological consideration of the things which are according to nature, should first be studied by medical men; since that which is in conformity with nature is right, and serves as a rule both to itself and to that which is wrong."

Were this simply-writ sentence but the interpretation of all medical men's thoughts, medicine were soon liberated from the doubts and errors which enswathe her. Not greater the discovery and enunciation of the circulation of the blood by our Harvey, than that grand lesson from him which I have read, and shall humbly try to follow.

Neuralgia, as a term expressive of disease, is the mere verbal definition of a symptom. Νευρον, nerve; αλγος, pain. Pain in a nerve – this is its full and entire meaning.

Neuralgia may thus, in strictest sense, be applied to pain in any part of the body, wherever such pain seems located in the trunk of a nerve, or in the termination of a nerve. Using the term in this general way, and in such way it is ordinarily used

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in medical language, sciatica is neuralgia of the sciatic nerve; and tic-douloureux is neuralgia of the fifth pair.

To understand the true nature of pain in the nerve trunk, or in the extremity of a nerve trunk, it is necessary to recall the meaning of pain, and the relation of the nerve to the expression of pain.

Pain, as it is but a degree, varying in character of the consciousness of sensation, cannot in physiological argument be disassociated from pleasure In a body at perfect rest, and removed from excitation of any kind, there is no sensation. There is streaming along that body a steady circuit of a sensational force, or perhaps it were more correct to say, that body is charged with a sensational force, which in perfect equilibrium is *nil* as regards sensation. Disturbed from this equilibrium by interposition of physical or chemical agencies, sensation is developed, or in other words, pain or pleasure is elicited.

For the production of sensation several parts of the organism are, however, called into play. We may mention three specially. The brain, as the grand centre point or mart to which the sensation is conveyed, and in which consciousness resides. Secondly, a series of cords commencing in endless ramifications about the body, and hastening, directly or indirectly, through the spinal column, to the brain or seat of consciousness. Thirdly, a supply of normal arterial blood in all those parts of the system in which nerves originate, and from which sensation emanates.

That these three conditions are necessary for the production of sensibility is proved by many experiments. If in a young animal the brain be removed carefully, the medulla remaining uninjured, death is not the necessary result. The animal may live, breathe, digest, fatten; but it is an animal incapable equally of sensations either of pain or pleasure, a vegetating animal, in point of fact. Or the brain may receive injury, and by such injury sensation may be destroyed, recovery taking place as the cause is removed. A blow on the head, producing what is called a stun, is an injury of this sort, and injury of the skull with depression of bone has sometimes led to complete loss of sensation so long as the pressure was continued. Numerous cases of this kind might be adduced, but the one, perhaps, which is the most striking is that recorded by Sir Astley Cooper, in which a man, after meeting with an injury to the skull with depression, laid for weeks, nay months, living it is true, yet dead to all around him, until Sir Astley relieved the depression and caused restoration of consciousness and sensation.

That nerves are the conductors of the sensational force from the extreme parts of the body to the grand centre of consciousness is a fact as abundantly proved as that the brain itself is the centre of consciousness. The proofs here rest on the fact of connection between nerve and brain, and the effects arising from the division of nerves, and consequent separation of the con-

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nection. Nerves taken altogether have, moreover, a double function; they not only convey the sensational force from the extreme parts of the body to the mart of consciousness, but they convey from the brain to the extreme parts that stimulus or directing will which, through the agency of muscle, secures volition. Hence nerves are classified under two grand heads, nerves of sensation and nerves of motion.

As a general rule, the trunk of a nerve, as met with in the body, is made up of fibres capable of conveying both sensation and motion. It is probable that there may be a division of structure in the nerve-mass, and that one part is devoted to the conveyance of sensation, the other to the direction of motion. But as yet, in nerves possessing this double function, no isolation of parts is known until the nerve approaches the spinal cord or the brain; then it is that the compound nerves divide into two parts as they burrow into the central structure, and it is at this point of division that the physiologist is enabled to discover the true compound character of the nerve trunk; for if at this point he cut through one of the divisions of the trunk, the anterior, he finds that the portion of body belonging to the extremity of the common nerve trunk has lost the power to move though its sensibility is retained; while if he divide the posterior branch (the other division) he finds that the sensation of the part is lost, while motion is retained. Lastly, he finds that if both divisions be cut across, sensation and motion are equally destroyed.

The ordinary distribution of nerves throughout the body is then in the form of compound nerve communicating as a general rule with a common stem or column of nerve matter enclosed in the vertebral column and communicating with the brain. But there are a few instances in which nerves, from the point of their origin to their destination, are either purely motor, or purely sensitive. Thus the optic nerve is devoted to the special sense of sight: and the fifth pair of nerves, which, in relation to our present subject, is most interesting, while it is a compound nerve in relation to its origin, and compound in its distribution in one of its divisions, I mean the inferior maxillary division, is purely sensory in its two superior divisions, the ophthalmic, and the superior maxillary. These divisions are well to remember; but the great fact of a physiological kind in reference to sensation bears on the compound nerves, and on the circumstance that sensation travels along these nerves from the extremities of the body towards the brain.

It is perhaps scarcely necessary to enumerate the proofs on which rests the demonstration of the course of the sensory impression, yet one or two salient proofs may be given. Thus—if I lay bare the trunk of a compound nerve and irritate it by pricking or application of a stimulant, I produce two effects, violent convulsive movement in the parts to which that nerve

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is distributed, and intense suffering in the same parts. The effect of the irritation has been conveyed in two directions along the nerve—towards the extremity to produce motion—towards the brain to excite sensation. But if I lay bare a portion of a compound nerve, say the sciatic nerve, which runs down the thigh, and place on it a ligature, I stop at once, by the pressure thus applied, the exhibition both of motion and sensation. The limb is paralysed. If now I irritate the nerve between the ligature and the foot I excite motion in the foot, but no sensibility, thus proving that the current of the motor force is from the ligatured point towards the extremity; but if I excite the nerve above the ligature then sensation is evidenced, but no motion, thus proving that the current of sensation is from the extremity towards the centre. Or, if I put two ligatures on the nerve at a distance from each other, and irritate between them, I produce no effect, but if continuing the irritation I remove the lower ligature I produce convulsive action, or, *vice versa*, if continuing the irritation I remove the upper ligature sensation is the result, without motion.

Those parts of the nervous system which I have up to this time been describing in their relation to sensation, viz., nerve-trunk, brain and spinal cord, constitute, as a whole, a great division of the nervous system called the cerelio-spinal axis—the grand division in which voluntary motion and sensation is placed.

There is still another system of nerves distributed throughout the body which is called the sympathetic system. The nerves of this class have no common organ analogous to the brain, but a large number of small bodies called ganglia or nerve centres. These ganglia or nerve centres have no direct connection with the centres of the cerebral-spinal axis; they are independent bodies connected together by their own nerves. As the cerebral-spinal system presides over voluntary motion and over sensation, and is, in fact, the interpreter of the will, so the sympathetic system presides over those functions of the body which are involuntary; as digestion, circulation, defæcation, and the like. The two systems, in fact, as far as they can be, are separated, but there are points in the distribution of the nerves of each where these meet and exchange communication. In this way, deranged conditions in the sympathetic system are conveyed to nerves of the cerebral-spinal system, and the irritation thus excited being conducted along a cerebral-spinal nerve, may give rise to sensation amounting to pain either at the point of irritation or at some distant point through the medium of the connecting cerebral-spinal nerve. When pain expressed in one part of the body has its origin in a remote part, in this manner we say that such pain is the reflex, an absurd term I grant, but the one commonly in use.

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Thirdly, blood is an essential for the production of pain or sensation in any part whatever, and sensation may be either destroyed or intensified in a part by a modification of the blood without any primary interference with nerve or brain; thus, if a part become too freely injected with arterial blood, pain is the result; or if a part be deprived of its arterial blood (as when a ligature is put round the main arterial trunk of a limb), complete destruction of sensation is the result until such time as the circulation is restored by collateral supply.

But perhaps the best experiment showing the necessity of blood for the production of sensation is the following: Let the arm or leg be placed in a case, such as is here shown, and so being closed in an air-tight chamber with an extremity protruding through the lower part of the chamber—let then a little pressure be placed on the main trunk of the artery supplying the limb, and let the air in the chamber be exhausted; let this be done, and two effects are produced. The supply of new blood to the extremity is prevented while the returning blood in the extremity is exhausted into the chamber. The result is, that the extreme part thus rendered bloodless is rendered painless also.

On a grand scale, loss of sensation from a similar cause occurs during syncope; the heart fails to supply its tributaries with blood, and destroyed sensibility is the consequence.

It would take me too far away from the practical subject of this present lecture to enter into such debated points as the nature of consciousness, the relations of the different portions of the nerve structure to the transmission of sensation, or the part which blood plays on the extremities of nerves for producing sensation. I may haply take up this strain again and follow it out more closely in my last lecture; meantime it will favour our description of the cause of neuralgic pain to keep steadily in view the following physiological truths, the whole of which may be pronounced demonstrative.

That the cause of pain in the nerves of any given part—say the dental nerves—may be central, that is to say, connected with the organ of consciousness—the brain.

That the cause may be connected with the extremities of the nerves, that is to say, with the nerves of the part in which the pain is manifested, either by irritation there applied, or by deranged condition of the blood in that part.

That pain in a part may be produced by irritation at some distant point lying between the part itself and the brain, that is to say, in the trunk of the nerve connecting the part with the brain, or in the spinal column.

Lastly, that pain in a part may have a reflex origin, that is to say, an origin from a part indirectly connected with the sensory nerves supplying the part.

We have seen that the disease neuralgia consists in an exaltation of sensation excited in the nerve itself. Upon this fact a

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great deal depends in a diagnostic point of view. The marked symptoms of neuralgia are easily understood when this simple fact is remembered. The pain is, of all others, the most excruciating, and patients know no terms sufficiently strong in which to express the misery entailed. Some idea, says Dr Allnatt, may be formed of the intensity of the pain arising from neuralgia from the following extract taken from Mr Hutchingson's pamphlet on Tic Douloureux:—"On rising from my bed one morning I suddenly felt a sharp pain. My first impression was that a wasp had stung me; but before I could examine the part whence the pain proceeded, I received a second and more severe shock, repetitions of which occurred in the most rapid succession for about five minutes; it then ceased as suddenly as it began. Though I cannot compare the pains to anything I ever felt (nor do I think the imagination can easily conceive, much less words describe, the exquisite acuteness of the paroxysm), yet I remember with the most vivid recollection the intensity of these first sufferings. On receiving the second shock I was instantly thrown down in a state little short of frenzy. I grasped the affected part with violence, rolled on the floor; then suddenly started up and ran round the room, until at length, being worn out with the agony of the torture, I sank on the bed in a state of almost senseless exhaustion. On recovering from the stupor I found my face covered with a cold perspiration, and my whole body in a state of nervous excitement."

I could quote numerous illustrations of this harrowing kind, but it is needless. The point of practice to be learned either from the above case or others being this simply; that the acuteness of the pain is the index to the disease which is at work; that it points to the veritable nerve as the seat of all the mischief. When sensation is at any time raised to pain, the nerve is the conveying channel. The sensation is severe when the nerve is the indirect medium of communication; but when the nerve itself is the seat of the pain as well as the medium, the additional suffering implied may well be one of the leading signs of the neuralgic malady.

Another symptom of this neuralgia is, that the pain is often the only symptom. Inflammation of neighbouring structures may be present, but it is not necessary, nor are its indications generally manifested. In some cases, as in neuralgia of the face, where the third or inferior maxillary branch of the fifth pair (the compound branch, that is to say, of this trunk) is involved, muscular twitching may also be present, but this is not necessary, nor indeed common. The pure origin of the pain in the nerve itself is thus again manifested. When the neuralgiac cause is seated at the extremity of a nerve, another striking sign of the disorder is the slight degree of excitation which will bring on the attack. The merest chill on the part, the merest warmth, the merest pressure, even the mental emotion which will blanch

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the cheek or suffuse it with a blush, will, when the trifacial is the seat of the disease, suffice to bring on the attack in all its intensity. "I am necessitated," wrote an intelligent patient once to me, "to live apart from the world in the heart of it, observing myself and being ever on my watchtower against all its influences, its joys, and its sorrows. I dare not laugh, I cannot for terror weep; I dare not think; I dare scarcely eat, for my enemy, even more watchful than I, is always at hand."

The disease often assumes a paroxysmal character, coming on at the same day and the same hour, under all conditions, in the same unbending routine. There is no fact in disease more remarkable than this, and none of which we know so little. Yet there is this important point always to be borne in mind when the attacks are paroxysmal; that the disease has ordinarily a central rather than a local origin. That the mischief, in a word, is more than skin deep, is in the blood, or in the central part of the nervous system.

I have said that pressure on the nerve of the affected side sometimes excites the attack. This is true; but there are cases in which pressure firmly applied relieves the attack. In these cases extreme cold acts in like favourable manner. When these things happen a favourable point in diagnosis is gained. For if cold or pressure relieve, the evidence is pretty certain that the pain is caused by some mischief at the extremity of the nerve, or at all events between the point of pressure and the extremity of the nerve. When neither cold nor pressure nor narcotic will relieve the suffering, then is the cause usually central. For when exalted sensation follows from the centre, removal of the pained part is curiously enough not sufficient to relieve the sensation. The sensation lives in the absence of the absent matter. In such cases you may divide the nerve feeding the whole part; yet the pain survives. This was the case in the often-recorded instance of Dr Pemberton, who, in the anguish of one of his attacks, kicked the bottom out of his carriage. Sir Astley Cooper, with that consummate skill for which he was so justly esteemed, divided the fifth nerve; the operation was useless: and why it was useless was made manifest after death, for the cause of the pain was found in disease of bone at the base of the brain.

In cases of this kind, where the face is the seat of pain, teeth are often extracted in vain. I have under notice at this time the case of a lady who, during years of suffering, has had every tooth in her jaws, on the affected side, one by one extracted. There is no relief. Still the attacks come on in all their intensity, and the extracted teeth relive in the volume of the brain.

In cases of this character, moreover, external excitation of the pained part is much less likely to produce the attack than in cases where the disease is local. The pain comes on without any assignable cause, in sleep, in hours of leisure, in hours of activity, whensoever it lists.

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If in this class of cases there are any exciting causes which powerfully influence the occurrence of the attack, they are two in number. One relates to the conditions of weather, the other relates to diet. A sudden fall of the barometer, accompanied with humidity, often now brings on the disorder; a sudden rise in the barometer may, too, have the same effect. So in reference to diet, whatever interferes with digestion—and especially whatever may be considered as excess in diet—developes the suffering.

Both of these exciting agencies act generally through the circulation. The central part, in which the seat of the mischief is placed, is oppressed with blood, and the excitant is thus applied.

In cases of neuralgia, where the disease is local, the general health is often but little affected, and death is not a result. But in cases in which the cause is central there may be symptoms which are of serious import, and which indicate too plainly the deep-seated character of the disorder. I have thus seen facial neuralgiac paroxysms accompanied by strabismus, and specially by apoplectic tendency. Apoplexy is, indeed, the not uncommon fatal result. It is the result of an extension of that central lesion which, in its less fatal force, gave birth to the disturbance in equilibrium of the sensational force, and to the development of the local disorder.

The paroxysm of neuralgia, in whatever way arising, ordinarily wears itself out for the time. I say wears itself out, and I mean so, for the destruction of the pain is really due to the failure of the force by which the pain is produced.

The same effect is, by analogy, manifested in instances where the motor power of the nerve is exercised to a great extent. In violent convulsive affections, as in chorea, tetanus, and epilepsy, the convulsive attack wears temporarily off as the nerve force, which supplies the stimulus to the muscular contraction, fails. In some guinea-pigs in which my distinguished friend, Dr Brown Séquard, produced epilepsy, by division of the spinal cord, the epileptic seizure could be produced at will in the animals by irritating them at certain points of the body. But at a given time only, a certain number of paroxysms could be produced. After five or six seizures, the exhausted nervous current failed, and an interval was required for recruiting rest. So it is with regard to the pain of neuralgia; the pain, I repeat, wears itself out, and an interval of recruiting rest time is necessary for the repetition of the attack.

The neuralgiac affection does not seem to be peculiar to either sex. It is most common after puberty. It is most frequent in certain parts of the body, the trifacial nerve being the part most frequently affected by it. In whatever nerve manifested, it follows out the course of the nerve, defining itself to the minutest ramifications. During the intensity of the paroxysm, all other pain seems in

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a great measure deadened. The mind concentrated on the one fact, a new sensation is impossible. Hence patients, during the paroxysm, will submit to division of the nerve, or to the application of the actual cautery, without any great demonstration or appreciation of additional suffering. Once having made up my mind that a diseased molar was the cause of the disease, I asked permission of a patient during the attack to allow me to extract the supposed offending body. He readily consented. The tooth was extracted, and not easily, and soon afterwards the pain was relieved. But the curious part of the narrative is, that the man did not only give no expression of superadded pain during the extraction, but declared afterwards that he felt none; an event quite possible and probable.

Considerable attention has been paid to the morbid anatomy of nerves in which the neuralgiac affection has manifested itself.

But in a sentence, without entering into such minute particulars as have been supplied, I may sum up by saying that nothing has been made out in this direction which throws the feeblest ray of light on the nature of the disorder.

The causes of neuralgia are complicate; by this I mean the secondary causes, for whatever be the causes of a secondary kind, the ultimate cause is one and indivisible, viz., disturbance of the equilibrium of the sensational force; we must be content in our ignorance to consider only the secondary causes,—and these are divisible into four great classes:

The General.
The Central.
The Reflex.
The Local.

The *general* causes of neuralgia are those which act through the system. The producing agent is a poison, which is making its round with the circulating blood. The poison may be received directly from without, or it may be formed in the body by mal-assimilation.

We know of two poisons, one belonging to each of these classes, which produce this effect, and it is possible that there are more than these two, as we shall see a little further on.

The first known poison of this kind, to which reference need be made, is the so-called miasmatic poison. I referred incidentally to this in my first lecture.

This disease-producing agent is the occupant of foul, undrained localities. It is probably gaseous in its character, and as a gas is breathed in the vitiated atmosphere, and entrapped into the system, by that current of blood which circulates through the lungs at the rate of not less than forty gallons per hour, exposed to the breathed air the whole while. The most probable entry of the poison is, I say, by the lungs; but there is another possible medium. From what we have recently learned, it is probable that the poison is absorbable by water, and that it im-

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pregnates the common water supply of some districts, setting up in the neighbourhood thus supplied the symptoms which are special to it, viz., ague or neuralgia.

The following illustration of this character was a few years since sent me. Up to the year 1850, a country district in the eastern counties was unenviably famous for its neuralgia and ague. Well nigh every one who visited certain parts of the place was attacked by one or other of these diseases. At last a clergyman who resided near observed, very acutely, that the diseases had a certain limitation, and there being great talk at the time about water supply and cholera, he bethought himself whether water supply and this endemic neuralgia might have any relationship. He inquired, and found that the affected district was supplied by one particular well, which had been in use much longer than the recollection of the oldest inhabitant. He persuaded the people to sink a new well on higher ground, and on a more artistic principle. The new well was opened, and the old well temporarily closed. There was no more disease. But one day, about a year after the closure of the old well, some families residing near to it insisted, for the sake of convenience, that the old well should be reopened. Warned of the possible result they were permitted their way, and in ten days there were eight new cases of neuralgia and ague; as conviction went straight home on this second outbreak, the poisoned water was again abandoned, and the diseases departed hand in hand.

We understand, then, pretty clearly the habitat of the neuralgiac poison, but we do not understand its nature; we understand how it may filter into the body, but we do not understand how it affects the nerve to produce the pain; for as the wing cleaving the sky leaves behind no scar, so this poison gives to nerve structure no visible lesion. All we dare say is, that as nerve centre and nerve cord are each supplied with blood for their nourishment, so empoisoned blood communicates to these structures a disturbance which destroys the equilibrium of sensation, and developes pain.

But there are some practical facts connected with neuralgia caused by malaria which are known, and as known are of peculiar interest to the Dental Profession. I will notice in a line or two three of these.

First, the neuralgia of malaria is developed (I think I may say always developed) most distinctly in the course of the fifth nerve. It is either facial neuralgia, or tooth neuralgia.

Secondly, the cases of it in these days ordinarily come from rural districts.

Thirdly, the type of the disease is marked by one grand sign, the periodicity of the attack. Not more certainly does St Paul's strike twelve at noon daily, than that the malarious neuralgia does at certain fixed times strike the sufferer. This is in a great measure peculiar to the form of neuralgia under

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description, and hence, when periodical neuralgia is once established, the cause is in the majority of cases plainly indicated.

But there is a second general poison which produces neuralgiac affection, of the fifth pair especially, and which seems not to be inhaled or absorbed from without, but to be the product in the body of certain disordered physiological conditions. Certain people are, under peculiar conditions of bad health, constantly subjected to severe neuralgiac attacks. This fact has led many writers to speak of the condition of body here glanced at, as a diathesis of itself. Recent observation has given rise to another view, which assimilates the neuralgiac diathesis with gout or rheumatism, and transforms it into a gouty or rheumatic diathesis, with a specific blood poison as the original source of the evil, and an excitement produced by these poisons on the nerve sheath as the exciting cause. There is nothing more reasonable than this modern view when accepted with due limitation. But it would be trespassing on the subject matter of a future lecture to enter on the point at greater length at this particular place, than to state that the gouty rather than the rheumatic diathesis is the most common predisposing cause of neuralgiac seizure.

I have said that some other poisons have been set down as the causes of neuralgiac attacks. Arsenic has achieved notoriety in this respect. Persons who have endeavoured to commit suicide by taking arsenic are, it is said, very liable on recovery to attacks of facial neuralgia. I do not think there is much sound evidence in favour of this conclusion. If there were, the physician or surgeon who prescribes arsenic in skin diseases would surely see the development of the neuralgia tendency more truly marked, than he who observes the effect of one large dose, which must have been returned from the body before recovery was possible. But the physician does never, as far as I know, see neuralgia as the result of even a long course of arsenical treatment. I have recalled this day twenty-six cases in which patients of my own, with lepra or psoriasis, have been kept under arsenical treatment for three months. They were all relieved or cured by the remedy, but neuralgiac pain was never a symptom. How many times more in the round of heavy dispensary work I may have prescribed arsenic, and kept no record of the case, it is impossible to say; it is very large, certainly; but I am ignorant of neuralgia as a result. On the other hand, arsenic is sometimes a very efficient remedy in neuralgiac cases.

But while I would not attach too much importance to arsenic as a cause of neuralgia of the face, I feel it a point myself to ask in troublesome cases whether arsenic has at any time been taken by the patient; and as I feel this a duty, so I feel it equally a duty for me, independently altogether of my own views, to state for the guidance of others the opinions of others.

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The class of cases considered under the present head, as they are produced by general agencies, are often amongst the most favourable in the way of recovery. The neuralgia arising from malaria will disappear on the mere renewal of the poison, as we saw in an illustration on a grand scale in both the present and a previous lecture.

The neuralgia arising from diathesis is often removable by modification of diet; and if there be a neuralgia from a general poison, such as arsenic, the elimination of such poison from the system is a mere question of time.

The *central* causes which produce facial neuralgia may be seated in the trunk of a nerve, at the origin of a nerve, or in the brain.

Any kind of growth or accidental formation occurring in these positions may develope the disease. Most frequently, however, the cause is in bone—some portion of bony growth presses on the nerve structure, and destroys the normal acts.

In Dr Pemberton's case the cause of the disease was found at the base of the brain; the dura mater was thickened, the frontal bone was thickened, and an osseous mass was found near to the crista galli of the ethmoid bone.

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You will find it sometimes given that simple pressure on a nerve by a soft body, as by a tumour or fluid effusion, is sufficient to produce neuralgiac pain. This is not strictly true. Gentle and evenly disposed pressure on a nerve produces just the opposite condition to neuralgia, viz. anæsthesia.

When, therefore, fluid pressure is the cause of neuralgia, there is added to the pressure something more. Either the nerve is mechanically injured or punctured, or the tumour which surrounds it is of malignant growth, and involves the nerve fibre in its own structure, or the nerve is in part torn by the pressure, and its neurilemma, or enclosing sheath, ruptured.

The fact I here state must be always remembered in relation to the origin of neuralgia from a central cause. The nerve must not only be pressed on, but injured; otherwise anæsthesia, instead of neuralgia, is the consequence.

The cases of neuralgia produced by central injury are of all others least hopeful, and most difficult to diagnose. The cause itself removed almost entirely from view, the utter inefficiency of remedies is too frequently the last and sad indication that the cause is really out of the reach of the practitioner.

If there are any special symptoms which from the first indicate central origin, these are they:

The attacks are not regularly intermittent.
They come on without any assignable cause.
They are of terrific duration and intensity.
Local remedies and operations are of no avail.
Pressure on the trunk of the nerve neither adds to, nor relieves the suffering.

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General remedies, such as quinine, do no service.

There is a common disposition to cerebral disease, as apoplexy or epilepsy.

Neuralgia, as occurring from *local* causes, is the form of the disorder of deepest interest to the dental practitioner. In all its forms it presents itself to him, but in this form most, for when facial neuralgia occurs from purely local causes, a tooth in a diseased state is the common prevailing cause.

This arises, not from anything specific in dental disease, but from the circumstances that a tooth, as connected with the periphery of nerve, is more subjected than other parts to such diseases of its own structure as shall expose the nerve periphery to excitation.

In a case where toothache in its most severe form occurs, from either exposure of the supplying nerve, or injury, or pressure, in such case the toothache is a true neuralgia, localized certainly, but still a neuralgia.

Toothache thus induced is, in fact, the simplest representation, both as regards cause and fact, of neuralgiac pain. But this neuralgiac pain, situated at the veriest extremities of the nervous distribution, is not given to travel far in the course of the nerve; therefore it is called toothache from its local character.

But neuralgia having a local origin and more extended range, may have a tooth for its centre in a way different to that which has been described. In such cases the tooth itself need not, in its crown part, be diseased, nor need its nerve be exposed. The disease lies deeper; lies often in the extreme point of the fang; and thus by injuring the nerve at its very outset from its parent trunk, and by injuring sometimes the trunk itself, the tooth distributes by reflection, or I had better said by conduction of excitation, the pain to the nerve supplies of all surrounding structures.

The pure "tic" from a diseased tooth is thus produced, and in other parts of the body a neuralgiac circle may have a similar causating centre, but this one illustration, as being the most familiar, will suffice.

The points of diagnosis in cases of this character are exceedingly important, and in such points of diagnosis, the Surgeon Dentist is often more expert than either Physician or Surgeon. Without any pretence at being more conversant than my compeers with this interesting diagnostic history, I cannot let the opportunity pass of stating, in a few words, by what common-sense principles we should be guided to ensure success in deciding on diagnosis in this form of the neuralgiac malady.

If, then, a tooth be found carious, and the pain be referred by the patient to the tooth as the originating cause, and if this tooth is tender and the touching of it intensifies pain, the common-sense view is, that the tooth is the cause.

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But if it happen, and this for reasons I have given is most commonly what does happen, an extended neuralgia is not traceable to a *carious* tooth; if the appearance of every tooth be sound, other and more refined diagnostic principles are required.

In these instances the points to ascertain are:—

1. Whether the neuralgia is confined to one side.
2. Whether the patient is himself conscious or suspicious of a central cause in the teeth.
3. Whether percussion of any tooth excites the pain.
4. Whether the attack is brought on by exposure of the tooth to variations of heat or cold.
5. Whether the pain is, or is not, intermittent.
6. Whether remedies applied to the teeth are transitorily effective.

Reasoning on these questions—if it be found that the neuralgia is confined to one side; if there is no distinct intermittence; if pressure on the nerve at its trunk relieve the pain; if local sedatives relieve the pain; and if the answer to the majority of the other queries be affirmative—the evidence is pretty clear that the cause is local, and that a diseased tooth is the local cause.

A very good test whether a neuralgia is or is not dependent on dental mischief deeply hidden, is to direct the patient when the paroxysm is on to take in his mouth and bring slowly in contact with the teeth iced water. As the cold is first felt, the pain may or may not be increased, but after a time, as the benumbing effect of the cold tells on the tooth, the neuralgiac pain, if the cause of it be local, will certainly be relieved for a period, and such relief is the clearest indication of the seat of the disease.

In this form of neuralgia, if the diagnosis be skilfully made, there is more real success in treatment than in any other. The cause is removable. Here the Surgeon-Dentist applies his art often with satisfactory skill; effecting with one sturdy twist of his ruthless hand, what the Doctor, with his whole shop on his shoulders, his alligators stuffed to boot, may vainly try to achieve in the lapse of weeks, nay, I am speaking from knowledge when I say, in the lapse of years.

The form of neuralgia which I have called *reflex*, is one of the most peculiar while it is certainly the most common type of neuralgia. This is so common in medical practice that some authors who have very carefully studied the disease (such authors as Allnatt for instance, whose papers on the subject are amongst the best in our literature), would ignore, I am sure wrongly, the three preceding forms altogether, and would centre the disorder entirely on the reflex cause.

We have seen what is meant by reflected pain; that the origin of the pain is at a distance from the pained part, and is the result of a reflection of the disturbance in one point of the nervous system to another and remote region.

Now, when facial neuralgia is thus the origin of the malady

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it is often, if not invariably, situated in the digestive system. We have seen by our diagram of the sympathetic system how thoroughly the stomach and its surrounding parts is supplied with sympathetic nerves, and it has been explained that between these nerves and the nerves of the cerebro-spinal system there is communication.

It is not difficult, therefore, to account for neuralgia of a remote part from these extreme centres.

Dr Allnatt relates the history of a medical man who, in travelling at sea, was suddenly seized with intolerable neuralgia of the fifth pair. He vomited some time afterwards a quantity of so-called bilious matter, and the pain disappeared on the instant. I could report a half-dozen similar experiences.

I was called, not long since, to see a man suffering from excruciating tic. He had uneasy sensation also at the stomach, and was disposed to vomit, an event which was encouraged. After vomiting, the tic left him, but the pain in the stomach increased. The next morning the man was jaundiced, and, without any return of the tic, passed through all the phases of disease arising from impacted gall-stone. Here the primary irritation caused by the central mischief was reflected, and the neuralgia was determined as of the reflex class.

The neuralgiac toothache common to phthisis and other exhaustive diseases is another illustration of the form of neuralgiac pain now before us.

A question has been raised why in these examples the fifth nerve should be so generally the selected spot for the manifestation of pain? This question it were difficult to answer; except by assuming that the nerve is more exposed to external conditions, favourable to the neuralgiac demonstration.

The diagnosis of cases of reflex neuralgia is generally not difficult. There are other signs than the pain, which lead the observant man to the seat of the mischief. There is usually some symptom of dyspepsia. A nausea—a constipation—a foul tongue—a stomachic uneasiness and sensation that something taken aforehand is not concocting in the exactly pleasant way.

The treatment of neuralgia must, in all cases, rest on the diagnosis; and as the diagnosis is in extreme cases very perplexing, it is not uncommon that the practitioner, pressed by the solicitation of the patient and his friends, is led to ask himself, not what he shall do, but what he shall persist in not doing.

In the neuralgia which depends on the presence of a poison —of miasmatic character—the treatment is two-fold. The best treatment is, removal either of the patient from the poison, or of the poison from the patient.

Medicinally, there are two remedies, quinine and the carbonate of iron. The quinine, boldly given, in one, two, or even five

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grain doses, three times daily, is the sovereign remedy. It may be given at the same time with the carbonate of iron; and in some cases when anæmia is added as a symptom such combination is very advisable.

To an adult, one or two grains of quinine with a scruple of the carbonate may be safely provided. In these instances, quinine does not act according to mere verbiage, as a tonic, but as an antidote. It veritably destroys the producing cause.

In the other forms of neuralgia included under the first head, I mean where there is suspected gouty diathesis, quinine may or may not be called for. I reserve this question for a more comprehensive study than could be accorded to it at this moment.

In the examples of neuralgia having a central origin, the plain truth may be told, at least in this place; there is nothing in nine cases out of ten which can be done. In such cases, teeth may be extracted by the set without relief.

The best of advice is general, and relates to externals. A pure air, a carefully regulated and simple diet; avoidance of excitement. To alleviate the extreme pain a cautious administration of a general narcotic may be resorted to; to prevent congestion an occasional purgative may be given; these are the only measures. They are much better than none, however, and the extent to which they relieve is great. But cure they do not. I have seen patients so circumstanced live on in comparative comfort for many weeks. I have relieved the extreme anguish many times by a full dose (say two grains of opium), and I never saw after mischief from this grand remedy; for this is well nigh an axiom in therapeutics, that when pain is destroying, opium, reasonably given, is never a destroyer. The pain neutralizes the narcotic. There is some great law yet to be discovered in explanation of this curious fact.

In cases where neuralgiac disease is clearly local as to its origin, and when the cause is within operative search, and is pretty well defined, there is but one reasonable remedy—and that is the direct removal of the cause. It is justifiable in such cases, where the particular tooth affected is not easily defined, to extract more than one, to extract till the right one is found. I mean these remarks to apply only to cases where the tooth is not evidently carious. If the tooth is carious, and the nerve exposed, the judgment of the operator may lead him to the destruction of the nerve and the stopping of the tooth.

In cases of tic having a purely local origin, local remedies are sometimes recommended. Belladonna, rubbed on the cheek as a narcotic local measure, is often useful. Dr Wood, of Edinburgh, has recently used narcotic injections inserted by a hollow needle clean down upon the nerve, and with good results. A full general opiate acts often with equal success, and quinine, if the pain at all approaches toward intermittence, is inva-

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luable. Attention to the digestion is of necessity an important measure.

I have said nothing about counter-irritants, in this local neuralgia. I ought to say that they are much used by many, and their effects are vastly praised. I, for one, am sceptical altogether as to their use. I have found no remedies so unavailing.

Galvanism in neuralgiac affections generally, and in facial neuralgia in particular, is now being used both here and on the continent with success. The continuous and the intermittent currents have both been tried; and each current has its advocates. I have but little practical knowledge of this remedial measure; but I think it promises well. It can, however, only do good in cases where the neuralgia is local as to cause; and its effect seems to be that it exhausts the nerve. We have seen that the neuralgiac pain will die out of itself for a time from the very exhaustion of pain. Galvanism seems to effect rapidly the same object.

In the last variety of neuralgia, the reflex, the treatment will naturally turn on the point of cause; and as the cause is ordinarily in one of the organs connected with the visceral system, with the liver, the stomach, or the lower part of the alimentary canal, alterative remedies are of unquestionable value. A purge often relieves effectually, and active exercise when the system is fitted for it, together with an aperient, are, in many instances, all that may be required. The selection of a purgative is wide. Dr Allnatt recommends small doses of croton oil as the remedy. Others recommend mercury. It seems to me that the old-fashioned pill of mercury and rhubarb, consisting of four grains of blue pill and six of rhubarb pill, is, if sufficiently active, all-sufficient. However, I would lay down no rule on this point, as every man has his own pill, by which he abides in faith.

If, in spite of simple alterative measures, the pain still continue, and if it assume the intermittent form in any degree whatever, quinine is again the remedy. Here, in cases where there is much debility, and especially if such debility is sustained by exhausting discharges, the mineral acids with the quinine are of much value.

In regard to neuralgia, under all its phases, there are certain common points of practice, which, when connected with cause, are easily remembered. In all cases the old treatment by depression is the treatment of systematic aggravation; the pain itself calling out loudly enough the while, that without the depressant the innervation was from the first enfeebled. In all particular cases, practice clearly turns upon the particular diagnosis, while the diagnosis turns upon the application of that knowledge which physiology supplies in regard to normal secretion and its cause.

In this lecture I have intentionally broken through the routine system of dealing with the subject before me, in order to

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illustrate, however feebly, a method of making the more difficult passages of a difficult subject cluster around a few primary and basic truths. The theme, far too comprehensive for one lecture, has thus, I trust, been preserved to a certain extent in its comprehensiveness, without, at the same time, being divested of that practical pointedness, which to the actual practitioner is the salt of knowledge.

LECTURE IV.

ON HYSTERIA AND ALLIED CONDITIONS IN RELATION TO SOME FORMS OF DENTAL AFFECTION.

Mr President and Gentlemen,

The subject of this evening's lecture, "Hysteria and Allied Conditions in relation to some forms of Dental Affection," is one which offers many difficulties to the lecturer. The subject is full of practical interest, but it has been so little studied, and is, as a literary effort, so novel, that one hardly knows where to break ground.

I have styled the lecture, "Hysteria and Allied Conditions." The allies of the disease on which I shall touch must include some affections of the convulsive type, to wit—epileptiform convulsion, and some rare forms of tetanic spasm.

The disease Hysteria, in its intimate nature and pathology, is so obscure, that it scarcely admits of classification as a disease *per se*. To it the charge against the witty Villiers might well be parodied:

> A sign so curious that it seems to be,
> Not one, but all disease epitome.

It does, in fact, in its manifestations, simulate almost everything. Insanity, inflammation, convulsion, syncope, coma, paralysis, every shade and variety of pain, anæsthesia, nay, death, itself.

But if there are any characteristic symptoms which this mocking disorder takes to itself, they are two—*convulsion* and *pain*. This fact carries the mind back instantaneously and naturally to the nervous centres as the seats of the disorder. There can be no doubt that in these the disease has centre, but in what way

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we have as yet no indication whatever. The disorder has no dependence on organic changes, in so far as we at the present moment can understand organic changes; the disease does not kill, and in persons most subject to it, who have died from other and more straightforward maladies, no lesion of any organ has been found to account for the longest standing train of hysterical evils.

This view of a pure central origin of the disease in the brain, taken with the fact of an entire freedom from visible lesion, has led many able thinkers to give to the disorder a metaphysical reading. They claim that the disease is an emotional fact—nothing less—nothing more—that it can be conjured up at will, or be the upshot of real and imaginary sorrow or joy.

But while by some the disease is thus enshrouded in mental phenomena, others of a more matter-of-fact turn, who make it a rule of faith that every physical act has a physical cause, have assumed that the origin of the malady is not primarily in the nervous system, but is traceable back further. These admit that the symptoms most obvious are due to derangement of nervous centre, but contend that the nervous system itself is first influenced in its nutrition by a more remote cause, and that the common symptoms may be considered rather to be developed through the agency of the nervous centre as a medium, than from it as from an independent source.

Some of the advocates of this view have traced the disorder to the uterus as the organ primarily affected. The very name of the disease is in truth derived from this notion, Ὑστέρα, the womb. If these were correct it is clear that the disease would be confined to the female sex. The disease is certainly so limited to sex in the vast majority of instances, but the rule has its exceptions, and the theory breaks down as a consequence. In rare examples, under the pressure of business anxieties, and as the result of great mental and bodily exertion, the male may suffer from as pure hysteria as the female.

A gentleman actively engaged in a mercantile pursuit in one of our great northern towns, met with severe adversity in the midst of what promised to be the most prosperous of human careers. Suppressing the facts of the hazard before him from all relatives, he laboured, as I have scarcely ever known man to labour, to meet and prevent the misfortune. He did not break down outright in the work, as is ordinarily the case, nor did his mind lose its acuteness. But, throughout the period of his severest moral suffering, hysteria in its wildest and anomalous forms was the great ailment. For hours I have seen this man in the convulsive hysterical state, sobbing, gasping, and laughing; for hours, at other times, I have seen him suffering from what is called an imaginary pain; and this state, which lasted for many months, was met best, at the moment, by the ordinary remedies for hysteria, and gave way at last to the same general treatment as

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that which the physician finds most competent for the removal of chronic hysteria in the fairer part of creation.

Another view of the cause which has been put forward, and which is much more in accordance with all the phenomena, is, that the hysterical condition depends on a general mal-assimilation. This view would refer the origin of the disease to a depraved condition of the blood; nor can we analyse the symptoms without seeing how pre-eminently suggestive this theory is of a primary source. Hysteria is never disconnected from bad health; and its only peculiarity consists in the fact that it is connected with what seem different varieties of modification in the normal standard of healthy life.

On this supposition three rational views as to cause are supplied, viz.:—

That whatever interferes with the nutrition of the body, whether indigestion, exhausting discharge, or exhausting pain, will, by interference with the organic forces upon which the formation, purification, and distribution of healthy blood depend, lead to depravation of blood and depraved nutrition.

That with a blood deficient in nutritive power, perfect and steady function in nervous centre is impossible.

That a pre-existing tendency to the hysterical state being supplied, local influences, temporary influences, pain, joy, emotions of any kind, are all-sufficient as the exciting causes of the acute paroxysm.

If it should be admitted against this view that mere mental emotion or over-exertion act as predisposing causes of the disorder, it must not, at the same time, be allowed that mental emotion or over-work are ever direct in their effects. The mental act operates through physical measures. The respiration is incommoded; the heart is put out of tune, or the digestion from various causes is rendered imperfect. Thus, the body is physically reduced in power, and the hysterical phenomena are the consequences.

This, then, is the first general principle I would lay down in reference to hysteria, and any and all of the evils which arise from it.

It is in all its manifestations due originally to some infirmity in those organic functions by the action of which the nutrition of the body is sustained; these modifications lead to error of function in the nervous centres, and specially in the brain, and from this secondary source, the grand symptoms of the hysterical disease, whether in form of pain or convulsion, radiate.

The symptoms of hysteria in its purest forms run somewhat as follows. They are preceded by some general disarrangement of health, very slight it may be, but still present. Or they are preceded by some physiological modification, such as the commencement of pregnancy in the female, which cannot truly

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be called disorder, but which by exciting a new series of conditions stands for a time in the same category as disease itself.

Then suddenly, on the merest provocation, mental or general, the active symptoms show themselves.

Sometimes convulsion is the only symptom; and this convulsion may be general, involving all sets of muscles, and twisting the body into every variety of contortion,—or it may be confined to the muscles of a particular region, as the muscles of the arms or legs.

The extent to which the muscular contortion is thus carried often alarms the inexperienced observer, who imagines that from such evolution the escape is impossible. The escape is, however, pretty certain, for in this convulsion those muscles which act involuntarily, the muscles of respiration for example, and the heart, take no share; the organic life is preserved.

In other cases there is not convulsion, but spasm of muscle, *i.e.* the muscle, in lieu of being subject to a series of rapid contractions and relaxations, over which the will has no control, is drawn to one point of contraction, and is there held. This fixed spasmodic state often gives rise to great alarm, and to the dental profession it is of much interest, because, by it, hysterical trismus, or an appearance of lock-jaw, may be induced. I have at least twice seen illustrations of this kind; I will sketch out one which has most bearing on our present work.

A hysteric girl suffered from what I shall by and by describe as hysterical toothache. Her brother, to give relief to the pain, placed over her face on the affected side a sinapism. Upon the pain produced by this the young lady suddenly found that she was unable to open her mouth. The state continued for hours, and a condition more strongly resembling trismus could hardly be conceived. There was really no danger except the remote one of starvation; but the friends were alarmed. To open the jaws I tried force, in so far as was prudent, but it was of no avail. I tried persuasion to the patient and encouragement, but to no purpose. The further each of these attempts were carried the more determined seemed the difficulty. At last chloroform was administered, and as the third degree of narcotization was approached the stiff muscle relaxed, and the rigid contraction did not return.

This is, in fact, a peculiarity of hysterical spasm, that when once it is overcome in a part it does not commonly return in the same part after the relaxation.

Connected with the symptoms of hysteria, there are two of a general kind which are of interest in that they show pretty clearly a systemic origin for the disorder. First, there is a free formation of gaseous matter in the alimentary canal, giving rise to eructation of wind, and to that peculiar sensation of fulness in the throat caused by this, and called "globus hystericus." Secondly, there is a modification in the renal

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secretion. The urine passed is large in quantity and frequent; it is devoid of colouring principle, and it often gives proof of the free elimination of lithic and phosphatic salts.

Add to these, the hysteric state is invariably accompanied by some general disturbance in the constitutional health. Anæmia is often present. Dyspepsia is an almost universal sign. Depraved tastes in the way of foods and drink manifest themselves; and debility and excitability are the well-known forerunners and after-runners of the hysteric paroxysm.

But that symptom which more than all others is interesting to us here assembled, is the hysterical pain which, flitting about in the body, now here now there, so peculiarly modifies and complicates the diagnosis of this disorder. I presume there is not a practitioner living who has not, at one time or other, been brought to a stand by this symptom. The pain of hysteria, wherever manifested, is the symptom most distressing, and is as remarkable for its steadiness of kind, as for its variability of position. It is differently described by different patients, but it has this common characteristic, that it is sharp and lanciolating, is rather relieved than increased by pressure, and is unattended by any of those outward and visible indications of suffering which attend pain resulting from inflammatory lesion; such symptoms as fever, quick pulse, or the local phenomena of redness, heat, and swelling. Often, too, the hysterical pain is removed by the merest circumstance. By the application of the simplest remedy, by some little occurrence which attracts attention and diverts the mind from the idea of pain as an existent fact. All these things give the proof, to the central origin of pain on the one side, and to the local immunity from organic mischief on the other.

The pain of hysteria, as it is flippant in its positions, is unsteady likewise in the diseases which it simulates. This is a necessity. Writers, therefore, who have studied this subject most carefully, have divided the hysterical pains into groups, having different names. The most elaborate classifier in this direction is M. Briquet, who gives, amongst other divisions, the following: *Hysterical Cephalalgia*, where the pain is developed in the muscles of the head; affecting principally the frontal and temporal regions. This, according to Briquet, is the most common of the hysterical symptoms; so common that in 356 cases of hysteria it prevailed habitually in 300. This pain is often pulsatile in character, and is as severe when the body is at rest and recumbent as when it is in motion. Another variety of this pain he denominates *Epigastralgia;* in this the pain is situate in the muscles of the epigastric or stomach region. This pain extends towards the left side, ascending as far upwards as the middle of the sternum, and descending as low as the umbilicus, but not lower. A third variety he calls *Rachialgia*, in which the pain exists in the muscles of the back; the pain in

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this case is most common in the lower part of the back, and on the left side of the spinal column; this pain is very intense and prolonged, and is too frequently mistaken for other more serious affections—as phthisis, and specially spinal disease.

Pleuralgia, or pain at the side of the thorax, is a fourth division by Briquet. It occurs most often on the left side, and follows ordinarily one of the two last-named forms of the disorder. *Cœlialgia* is a fifth variety, in which the pain has its seat in the walls of the abdomen. *Thoracalgia* is a sixth form, in which the anterior part of the chest is the seat of suffering; and, lastly, *Melyalgia*, from Μελος, a limb, is a sixth modification of hysterical algias, to which M. Briquet has given a soubriquet. In this form the pain is met with, sometimes in the superficial, sometimes in the deep-seated muscles of a limb. This pain does not commonly follow the course of the nerves, and is consequently different from neuralgia, while the emotions exert over it the greatest influence.

In these illustrations by Briquet, the correctness of which may be accepted as a general fact, the hysterical pain is described as situated in the muscular system, and some writers, but very few, I believe, would confine hysterical suffering to muscular structure, or rather to the fibrous portion of that structure. The rule, however, is, that while in muscle, or rather in the course of certain muscles, is to be found the region in which hysterical hyperæsthesia, or increased sensibility, is most common, other structures are liable to the same impression. Nerve, joint, and tooth, I note specially as parts in which this peculiar manifestation, emanating from nerve centre, may be exhibited.

Hysterical affections of joints are known to all practical surgeons. Men of hasty judgment, or unlearned, mistake these affections now, and treat them as veritable organic disorders—mistake them for rheumatism—mistake them for chronic disease of cartilage, synovia, or bone. They are indeed difficult to diagnose, and can only be distinguished by the absence of certain signs which peculiarly characterize the true organic change in the nutrition process, and by the presence of other indications of hysterical tendency.

Hysterical hyperæsthesia in nerve, is of no uncommon occurrence. Hysterical pain affecting the side of the face and simulating tic, is by no means rare, and I am surprised that writers on neuralgia have not spent more time in the investigation of this deceptive disorder. It is of great importance to know the diagnosis of this disease on many counts, and particularly in reference to cases where operative interference in relation to tooth extraction is required. The diagnosis is in rare cases difficult, but its leading points may be classified and enumerated in a few sentences. The attack is almost entirely confined to the female sex, and is as a general rule accompanied by some of the other characteristic signs of hysteria. The pain alternates with other

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pains. To-day it is in the face, to-morrow it is in the side, anon it is in the back, or again it is in the arm or leg. Such flying symptoms can only be confounded with the symptoms of gout or rheumatism, and from these they are distinguishable not merely from the presence of other hysteric indications, but from the absence of that acute febrile disturbance which invariably attends these diseases. Again, the pain is induced, in the majority of instances, during or directly after some excitement. It follows perhaps a convulsive paroxysm, or it follows after a verbal description of similar pain in another person. It responds, as it were, to the emotional will of the patient.

The character of the pain is different from true neuralgia. It is lanciolating certainly, but it wants the biting edge of the true affection. It does not give rise to the same intense expression, and it wears out the strength less rapidly. It has no periodical recurrence, and no special period of duration.

The pain, moreover, is not equally and systematically divided amongst the nervous filaments. It may be more diffuse than in neuralgia, and it may, on the other hand, be more localized. Generally it is pulsatile, that is to say, there is with it a constant twitching of muscle near the pained part, and not unfrequently a general muscular snatching in other parts of the body. Pressure applied over the cheek gives rise to various effects. It is ordinarily strongly resisted at first, and a positive declaration is made that touch gives an increase of suffering. It would seem really that a gentle touch does excite. But if the mind can be diverted, and pressure be commenced and steadily increased until it is very firm, relief is almost invariably ensured; nor does it much matter how the pressure is applied, so long as it is near to, or on the pained part. I mean that pressure on the trunk of the supplying nerve, is not more effective than pressure of a general kind.

As the most trifling mental act will induce the paroxysm, so an emotion equally trifling will take it away. Even conversation of an animated kind, and especially conversation which concentrates the mind on opposition, may, for the time being, remove the symptom.

When these peculiar features of the facial pain exist, and when they are unaccompanied by those other more serious indications which I sketched out last week as referable to central neuralgia, the diagnosis is pretty clear, the pain is hysterical, or is to be treated as such.

Hysterical pain in a tooth, or hysterical toothache, is a symptom more common, I believe, than is ordinarily supposed, and more common than the symptom of hysterical tic above adverted to. In the cases where hysteria thus shows itself, the pain may take three kinds of positions.

It may extend to several teeth.

It may be fixed in one or two teeth which are sound.

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It may be pitched in a tooth which is more or less carious.

I believe, however, as a general rule, that hysterical toothache fixes on a tooth which is diseased.

As with hysterical face-ache, so with this variety of the affection, it belongs to the female sex. But not exclusively. I knew once a hard-working student, who in his overweening ambition cropped from sleep its fair proportions, and who, in the excitement of competition for school honours, was subject to hysteria, modified in form, it is true, but so distinct that even a boarding-school young lady of refined accomplishment, and spindle waist, need not have been ashamed of it. Well, this young man, dosed in early life with mercury, had dreadful teeth, and ever when the moment of excitement was over, and the false strength gave place to the true exhaustion, toothache, excruciating toothache, was the uncompromising visitor, together with all the other signs of the hysteric enemy: restless mind; restless muscle; active kidney; cold skin, and choking throat; symptoms, one and all, which, with the pain, sleep alone could cure. But this is exceptional as a case, the hysterical toothache is confined mainly to the female part of the community, and to them under conditions which are in themselves exceptional.

The toothache of pregnancy is one of those exceptional instances. This toothache is, I believe, always connected with hysterical tendency, and is dependent upon that tendency in great part.

Sometimes the hysterical toothache of pregnancy is the severest of all forms of the affection. It is maddening in its torment. Fortunately for the sufferers from it, it is brief in its duration, and is not common to the whole period of utero-gestation. It occurs usually about the third month of the gestation period, and recurs at intervals during a space varying from three to five weeks. It is ordinarily preceded by some excitement or exhaustion, and it comes as suddenly as the winged arrow, fixing itself straight into the sufferer.

I have seen some striking instances of this form of odontalgia. One illustration can scarcely be out of place.

A lady was engaged in preparing a ball-room for visitors in the evening. She had been for some days before in indifferent health, with tendency to hysterical paroxysm. In the midst of her occupation she suddenly uttered a piercing cry, and in an instant was frantic with agony. There was no mistaking the fact of suffering, for every limb shuddered, and cold sweat bedewed the cold face, which was distorted with pain. In the intensity of her anxiety she tore up every thing in her way, and neither reason nor persuasion could for a moment influence the frantic expression of a torture which seemed unendurable.

The seat of the pain was a carious tooth in the upper jaw, the first molar, a tooth which for a long time past had given no anxiety or trouble. From this point the pain seemed to extend

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all over the body, but in the tooth it was concentrate. On the application of chloroform to the cavity of the tooth, the pain as suddenly ceased, leaving the patient as free from pain as at any previous period. Afterwards, however, for the succeeding one or two weeks there was occasional smart returns of the ache, with equally rapid subsidence on the application of a narcotic.

This case is a very fair representation of the worst form of hysteric toothache during pregnancy. Here the ache was seated in a diseased tooth, and, as I have said, this selection is not uncommon. The rule apparently being that if a diseased tooth is present, it will be selected; but if there be no such diseased tooth, the ache, should it occur, will be general, and though often of extreme intensity much less piercing and more bearable.

In these forms of hysteric toothache, the origin of the mischief is undoubtedly uterine. In the change which is taking place in the maternal economy, in the construction of that new circulatory system upon which, out of maternal blood, another body has to be steadily fed for months to come, great modifications must need take place. In the midst of this change, and as the result of it, hysteria is one predominant feature, and the hysteria pain is a further exhibition of the first derangement.

But hysterical toothache sometimes occurs in the simpler forms of hysteria. It is not so frequent as the varieties of muscular hysteria pain noticed by Briquet, but it is not unfrequent, and very few confirmed hystericals escape a touch of it, at one time or other. When it occurs, as in the toothache of pregnancy, the pain usually selects a diseased tooth for its place of manifestation; but the capriciousness of the disorder is shown in this, that removal of the tooth presumed to be affected does not relieve the pain from the jaw, and not always from the spot. The pain remains in the jaw at the point from whence the extraction was made, and the unfortunate operator, upon whose shoulders the continuance of the pain is often laid, gets no little blame, for long periods afterwards, for the cruel, or the reckless, or the imperfect mode in which he performed his unpleasant task.

I had a dispensary patient under my care for nearly three months last year, with a continued pain in the jaw, the result, as she asserted, of Dentist atrocity and intentional spite. I believe that this woman will wage war against all Dentists till her last breath, and that if she should ever come into power, it would be her first act to blow up the College of Dentists, and behead the President, whoever he might be. In fact, the woman has a hysterical mania; the tooth was very well extracted, and the edges of gum are firmly united. But the pain, which was always centric, that is to say from the brain, was merely reflected to the tooth, and now that the tooth is gone, it is reflected to the extremity of the nerve by which the tooth was fed.

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The mistake made consisted in operating in such a case at all,—but of this in its proper place.

The diagnostic signs of this form of odontologia are not difficult to the experienced practitioner, but to the inexperienced they are perplexing; and they are more perplexing to the Dental practitioner than to the Medical man, because the former by the nature of his speciality is prevented from making those inquiries into collateral symptoms which the medical man would institute at once, and on a knowledge of which his opinion and treatment would in nine cases out of ten be based.

At the same time there are certain general signs of hysteric toothache which are on the surface, and are fairly diagnostic and reliable.

First, there will always be found, either in the present or previous history of the case, some symptoms expressive of the hysterical tendency, some history of hysterical convulsion, and some presence of nervous excitement and trepidation.

There will also be commonly evidenced signs of debilitated health—an anæmic cheek, a lax fibre, a rapid feeble pulse, and a corresponding quick and excitable respiration.

If the inquiry into preceding symptoms be pushed, other proofs of hysterical pain will be gleaned. One or other of the symptoms which have been described under the names suggested by Briquet will have been present at some recent period; as a general fact, indeed, the patient will be full of lamentations as to the existence or recent existence of similar pain in other parts of the body, of brow-ache, or stomach-ache, or shoulder-ache, or stitch in the side.

The character of the toothache itself will be sure to attract notice; it will be found perchance to disappear altogether, if the mind is powerfully diverted to any taking topic. If the tooth is examined, however, when momentary excitement is quieted, it will be detected that interference with the tooth itself, if a special diseased tooth is present, does not materially aggravate the evil, or it will be found again that the patient is unable to fix on any one tooth as the true seat of the pain.

But that which most clearly indicates the simple fact of mere hysterical odontologia, is the almost immediate relieving effect of a narcotic remedy. The remedy is none the worse, too, if on its side it leave a little pungency, and excite some degree of sensation.

For all purposes, on these occasions chloroform locally applied is the best measure. The diffusibility of the liquid, the sensation it conveys, the smell and the rapid narcotisation of the parts, all lend to it an influence which is magical in its results.

To stop a hollow tooth, in pain from hysterical ache, is one of the immediate triumphs of tact in dentistry; and the more severe the representation of the pain, the more readily is it quenched by this ready method of relief.

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There is yet one more diagnostic sign of hysterical toothache, and that consists in the circumstance, that the intensity of the pain is no measure of its duration, and that when the pain ha departed it leaves no lingering throb or ache behind. The pain is electrical. Ordinarily, after odontologia from exposure of nerve to air or other irritant, the suffering even when it is blunted, is for a time felt; so that the sufferer is in constant terror of eating and drinking, lest it should return. The tooth is tender, and reminds its owner, on the slightest approach of a foreign body, of the *noli me tangere* maxim. The same obtains also after neuralgia; there are signs of tenderness, stiffness, and a physical impression long remaining of that which has been.

So, with regard to the *commencement* of either of these aches, there is some premonitory signal that pain is on the advance. There is sensation of gentle dart, or, curiously enough, there is sensation of numbness as the foregoing prophet. In the hysterical variety, all these symptomatic items are wanting, *post et ante*. Thought itself is not more swift than the onset; action not more rapid than the retreat.

As the pain may, as we have seen, be relieved by mental diversion, so may it almost at any time during the hysteric period be induced by similar emotion. The patient can summon it almost by her own will; it acts by her as the soldiers by the Roman centurion, who always came when he called them, but sometimes came when he did not want them.

The evidence from all these facts is very satisfactory in so far as it explains the seat of the malady; it proves that whatever may be the primary or predisposing cause, the excitement to the symptoms is in the mind's organ—the sentient brain.

In this description I have given the history of pure hysterical toothache. It is not absolute, however, nor must it be conceived as absolute that this toothache is the necessary accompaniment of hysteria. There may be true toothache together with general hysterical tendency, or true neuralgia with general hysterical tendency. And it is by no means rare for hysterical people to suffer from both these affections, as the result of the same causes, as severely as from those causes which lead to the same affections in the robust; viz., exposure of nerve from caries, cold, or by an agency influencing the pained part by general or reflex action.

One particular point in this respect bears notice. Hysterical people are often confirmed dyspeptics, and indeed it is doubtful whether hysteria is ever present, or is ever possible with an unimpaired digestion. In so far, therefore, as indigestion is capable of exciting a neuralgic face-ache by reflex action, and in so far as indigestion, by its induction of depraved salival secretion, is capable of causing irritation of an exposed nerve by the agency of an irritating secretion, so is the indigestion of

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hysteria capable of producing either true neuralgic pain or true odontalgia.

The diagnosis of toothache or neuralgia thus induced will rest on the broad facts relating to the character of the pain, its mode of occurrence, its duration, and its response to external measures, diagnostic or remedial.

Hitherto, I have dwelt on the influence of hysteria in producing painful affections situated, apparently or really, in the teeth or the parts adjacent. But there is another relationship between tooth affection and hysteria, which is not of less moment than that which has gone before.

Hysteria may develope toothache; the reverse may obtain, toothache and irritation in tooth may, under favouring conditions, develope hysteria, and hysteria of the most determined kind.

It is sometimes the fact, that in children of nervous temperament and excitable disposition, hysterical convulsion, simulating epilepsy, accompanies, or rather results, from the irritation of the second dentition.

This result is most probable in instances where the dentition is prolonged, and where it occurs later than is ordinary. In such instances the hysteria may simulate numerous spasmodic affections, such as chorea or St Vitus dance, many forms of muscular pain, epilepsy, or trismus.

In instances such as these, the effect, through the nervous system, belongs again to the order of reflex phenomena. But in these examples the irritation at the one point sets up, not a reflex pain, but a reflex motion. The sensation, borne from the pained part along the nerve to the brain, is reflected back by motor filaments to the muscles which either directly or indirectly communicate with the nerve centre. As in common response to sensation, the hand feels, the brain receives, and the muscle answers—so here the tooth feels, the brain receives, and the muscles contract; but with this difference, that the exciting sensation is unqualified; the central impression is extreme, and the response is involuntary and diffusive.

The effect of the second dentition in producing this reflex convulsion in children of feeble and anæmic build, and of hysterical tendency, is much more frequent than is imagined. I believe I once saw a death from prolonged convulsions from this cause; and I have certainly seen sufficient evidence to excite suspicions, which examination has confirmed, that in cases of convulsive disease occurring during the second dentition, the irritation often supposed to be due to worms in the intestinal canal, or to irritable temper, or to dyspepsia, is really seated in the mouth, and is as distinctly traceable to dental irritation, as the convulsions of infancy are due to a similar and better acknowledged cause.

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In these cases the irritation excited is not in the teeth which are being replaced, nor in those which are replacing the deciduous set, but in those of the second casting, which meet with opposition at their first appearance, and have to make their way through the opposing structure by the absorption process.

Touching on this subject some very valuable information was collected some twenty-five years ago by Dr Ashburner. Whatever may be the feeling of the Profession now in regard to the later works of Dr Ashburner, it must be admitted, in reference to his papers on Dentition, that in them he brought forward many all-important truths, and much that was novel in his time.

I have recollection of a case so analogous to the following one recorded by this Author, that the two cases may be considered as in symptom identical.

"A boy twelve years of age was cutting the second or posterior permanent molares of the upper jaw before those of the lower, and the process was accompanied by twitchings of various parts of the body. At last he became affected with chorea. Being a very nervous lad, if any notice were taken of him he would quite involuntarily make the most extraordinary grimaces, and contort his body into attitudes that appeared to be most difficult and painful. His chorea continued for three months, during which time a variety of medicines were swallowed. At last he fell into an epileptic fit, struggling much, foaming at the mouth, and grinding the teeth. I thrust my forefinger along the inside of his cheek, and found a hard cartilaginous space on each side, behind his first molar teeth. I succeeded in gashing these parts; he uttered a scream and fell out of his fit, becoming quite sensible; nor had he a recurrence of his chorea."

There is, again, another condition in which hysteria, or one of its allied disorders, may be excited by mischief in the teeth. I refer to the hysteria which often attends the cutting of the dentes-sapientiæ in young persons, especially in young women who are predisposed to hysterical paroxysms.

A young girl came under my care in 1855, and remained as a patient for many weeks. Her symptoms were those of hysteria, but from the description of the fits which according to the mother's statement she suffered from, I judged that she must be subjected to epilepsy, or at least to severe epileptiform hysteria. I treated her first with tonics, but no good having resulted, and feeling that some local mischief must be at work, I gave purgatives on the speculation of the presence of tapeworm or lumbricus. It was clear that tonics did not relieve, and that depressants increased the malady. Ultimately, there were general twitchings in the muscles, not exactly amounting to chorea, but such as are seen sometimes after the administration of strychnia. I was unavoidably kept from dispensary work for a few weeks, and returning to it was surprised to find a great improvement in this patient. She had been in great pain and

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had cut a wisdom-tooth, since which she had lost all symptom of convulsive start. How I blamed myself for carelessness in not having examined for this simple cause of irritation, I need not say. How quickly I should have examined for it had my patient been in her first, instead of her last dentition, I need not explain. Suffice it, that I never meet with hysteria now, of extreme kind, if the excitant seems to be local, without asking in the most solicitous manner after the wisdom teeth.

Dr Ashburner has several cases equally in point, in which epileptiform hysteria, and tetanic hysteria, were one or other present.

I select a single illustration from this record.

"A young woman, nineteen years of age, with light hair and fair complexion, with fine tall figure, rather fat, was in the year 1818 an apprentice in a straw bonnet shop in Hayes court. The occupation was sedentary, and she had not been in the habit of paying attention to the state of her bowels: they were suffered to be very costive. For several months she had perspired very profusely at night, and her breath had been observed to be very offensive; she started in her sleep, and repeatedly awakened her bedfellow by kicking her on these occasions. She moaned and talked in her sleep. Dr Nutall, who was my colleague at the Westminster General Dispensary, was suddenly called to her on account of her having fallen into a fit. He caused her to be profusely bled, and she recovered so far as to be able to see her physician at the Dispensary. Three weeks afterwards, the doctor being from home, I was obliged to see this patient in a fit similar to the first she had had. I learned that she had been very odd and nervous in her manner, and had often suddenly screamed out from cramps seizing her toes and the calves of her legs, which were succeeded by her thumb being drawn inwards towards the palm of her hand, and her fingers being clenched upon it. I found her in a state of tetanus. The convulsion was over, I thrust my forefinger into her mouth, where I found the wise teeth of the upper jaw through. In the lower jaw the teeth could not get through, for there were hard cartilaginous substances in their way. Through these I scored freely, and the young woman was relieved instantly."

In girls predisposed to hysteria by preceding bad health, even slighter causes than those I have named are sufficient to excite the hysteric paroxysm. "A young lady on whom I was once in frequent attendance for hysteria, and in whom the symptoms were easily excited, was taken suddenly ill with convulsion which had more than hysteric meaning, and which was persistent. In the intervals of calmness, which indeed were few, I endeavoured from the immediate history of the symptoms to gain an insight into their cause. At last she admitted to me that she was in pain in the mouth, and bit by bit, and on pressing the necessity of examining the mouth, I learned that the day

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on which the symptoms appeared a false tooth had been provided, that soon after the operation intense pain resulted, that in her desire to conceal the fact of an artificial front grinder she had borne up against the pain, until the hysteria, epileptiform in reality, was the result."

I insisted on instant removal of the new and offending cause, with the effect of entire and rapid subsidence of the symptoms.

Afterwards, at my suggestion, the new tooth was fixed with the plate simply.

This is not the only case in which I have had occasion to suspect the pivot of doing more than it was intended to do; and with great deference to the practical knowledge of my audience, who are much better able than myself to judge as to the manipulative advantages of pivot over plate, I, from the medical side of the question, pronounce the pivot a decided bore.

In a modified form I once saw similar results from the pressure of an amalgam stopping in a carious and irritable tooth. The symptoms were attended with a neuralgic face-ache, and were of frequent occurrence. At last it was thought best practice to remove the tooth altogether, after which there was no return either of pain or spasm.

The pressure excited by irregular and lapping teeth seems sometimes to exert a similar influence.

Lastly, a series of carious teeth, which may not in themselves ache, but which keep up constant irritation of gum, and retain a putridity of breath offensive to others and self-poisonous, stand amongst the common of the exciting local causes of dyspepsia, anæmia, and hysterical paroxysm. The author I have referred to above has seen even a condition approaching to epilepsy from this cause.

The treatment of the various kinds of hysterical disorder, either as developed in the teeth, or excited by them, is complicate, and is often of such nature, that the Dental practitioner has but spare opportunities of exerting his skill in its advancement.

The hysteric trismus, if it will not yield to simple measures, such as gentle force, or persuasion, or quiet mental diversion, will sometimes yield to a start, or sudden mental action. It is astonishing the effect of mental shock over spasmodic muscle. In the surgery of a medical friend, I one day saw a woman whose third finger was spasmodically closed and locked; so it had been closed for two days. A young assistant, who thought that force was practice, like the young trumpeter who thinks that noise is music, had inserted a small rod under the arched finger, and was trying by main violence to wrench the crooked limb open. The more he tugged, the more intent was the mind of his patient on the fact, and the greater the resistance to be overcome. Ascertaining the nature of the case, I withdrew all forcible plans, and placing the face of the woman to the window, treated the matter lightly and got her tranquil. Behind her on

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the wall was a cage containing a singing-bird, and while she was being attracted with something before her, I succeeded in setting open, noiselessly, the door of the cage. Then I returned to the stiff finger, and began to examine it gently. The plan contemplated succeeded. The little prisoner, his prison open, soon took advantage of his liberty, and hastened out, first on to the top of the cage, then suddenly to the closed window with great noise and flutter.

The patient, startled, was in an instant all attention to the bird, and at the same instant her finger, under my guiding will, was as straight as could be wished.

When her excitement was over, she would hardly believe that the finger was relieved, but seeing it so she must needs run her head against the notion, that now she could not close it. I bade her not try, explaining that a straight finger was better than a crooked one; and sent her home laughing at her adventures.

It is just the same in hysteric trismus in its milder forms; a little persuasion, or a little diversion, and the rigid muscles are set free.

But if these means do not succeed, and friends are anxious, chloroform by inhalation is the remedy. This, carried to the third degree of Snow, is certain in its effects, and as far as I know is free from any unusual danger when administered by a prudent and experienced hand.

Hysterical tic is best treated, during the time of the paroxysm, by soothing remedies. Warmth is always useful, and the counter irritation from a sinapism is a simple and effectual measure. In hysteric pain of this description, galvanism seems of great efficacy. It acts here as it does in tooth extraction, as a grand foil, or to speak more definitely, as a diversion. It has all the properties of the mustard poultice without the mustard. I can quite believe that there is no intensity of hysteric pain which will not subside for the time under galvanism, while there is this advantage in the remedy, that it is a diagnostic, as well as a medicament. For if the pain is not relieved by the galvanism, the chances are as 99 to 100, that the pain is not hysterical, but of more profound signification.

The true hysterical toothache is ordinarily amenable to narcotic remedies. I have already shown to what advantage chloroform may be applied in its treatment. Counter-irritants are here again advisable—mustard or galvanism, between which there is so close a relationship. But the great art of the practitioner, in these cases, lies in making them out first, and in setting them free from serious interference afterwards. Where the pain is centric and emotional, a soothing impression made on the extremity of the nerve may, by conduction to the brain, relieve the suffering. But a painful impression, so conveyed, can only increase the suffering. Hence I warn the student practitioner, for the matured practitioner will anticipate me, that if he wishes to

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escape hysterical anathemas from gentlest voices, he will let the hysterically-pained tooth rest till the hysteria is gone, at all events. He will neither stop it, nor pivot it, nor extract it; nor give the patient cause to say of him one word more blameful than the old adage:

> Our Doctor is a man of skill—
> If he does you no *good*, he does you no ill.

The cases of hysteria which result from irritation in or about the teeth, require in the matter of treatment, a consideration the opposite of that which has gone before. In these cases the diseased local structure is the exciting cause of the general paroxysm, and it is therefore requisite that in so far as such local cause is removeable, that it be removed.

If then, in such case, the gum is an obstructing surface to a presenting tooth,—as in infancy so now,—the gum should be incised freely. If the gum is very hard and white, cartilaginous in fact, and if the crown of the tooth is not deep under the surface, it is best to remove a portion of the gum at the upper part altogether. The gum lancet and a free circular section suffices for this. But if the gum is soft, vascular, and tender, a straight or a crucial incision is to be preferred, and will be found sufficiently effective.

When any foreign body in a carious tooth is the cause of local irritation, the point of practice naturally is, to remove that cause, whatever it may be; and if this cannot be removed alone, to remove the tooth altogether.

When several carious teeth exist, and produce, with fœtid breath, a constant irritability and excitement to hysterical passion, there can be but one line of treatment in ordinary cases, and that is to remove all the sources of irritation. Palliative measures, in shape of warranted washes, and guaranteed dentifrices, are warranted shams. Let me be understood, I do not say that, under certain circumstances, as where gums are spongy, the operation may not be prudently put off for a season; and I do not say but that under such conditions, an astringent wash, or an antiseptic wash, may be advisable, and the very best temporary measure. Not at all, I mean simply that in these cases, the medical side of the Dental art teaches from experience that extraction, where practicable, is the true practice.

These, then, are the principles of local practice in such disorders of the Dental organs as are allied to hysteria. But as the hysteric condition is based on something beyond the local mischief; as there can be no hysteric ache or pain, without a predisposing condition or hysterical diathesis; as no local mischief can induce hysteric convulsion in the absence of such diathesis; so it is clear that the true and basic treatment of hysteria must be directed to the removal of those systemic or constitutional derangements which supply the diathesis.

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Here in treatment there are some general rules which every one can understand, which often effect more than physic, and without which all physic is of little avail. These rules are hygienic, and as such are necessarily simple. The first item in the prescription is—pure air; the second exercise of body; the third mental rest, if mind is over-done; the fourth a diet of rigid simplicity; the fifth cleanliness; and the sixth regularity in times of action and sleep. What, say you, a panacea these for all the evils flesh is heir to, and Physic and Dentistry going in solemn procession to their burials? Even so! but the risk is little of the burials; not because the rules are bad—but because the general practice of the rules is too remote in the future to affect the present generation in the least.

The medical treatment to be adopted in the instances cited, turns, in every case, on the cause which seems to lie nearest to the root of the evil. I could not here enter into detail. If the primary cause be a flux from mucous surface, astringent remedies, as the mineral acids, with quinine or iron, may be the indication. If the cause is an impaired digestion, stomachics or purgatives may be indicated. If anæmia seem the basic evil, iron may be the all-efficient remedy.

Suffice it for me now to rest content on what has been inculcated in the natural treatment of those classes of the hysterical phenomena where the teeth are concerned, and in relation to the management of the Dental structures during the hysterical diathesis.

One of two short recapitulations may recall and fix on the mind the points of chief interest.

1. Hysteria, as a constitutional malady, has its origin in a degraded nutrition.

2. Its phenomena are all developed through the agency of the nervous centres.

3. The phenomena, stripped of all accidental and extraneous appearances, are made up of two elementary changes—exalted sensibility—exalted irritability, i. e. pain, and muscular convulsion.

4. The muscular irritability may be special or general. Differing in degree; it may be a simple twitch, a powerful convulsion, a spasm.

5. The pain, common to all sensitive structures, may take the course of muscle, nerve, or membrane.

6. The diathesis being furnished, the reflection of pain from a nervous centre may extend to any local spot; or the diathesis still being present, a locally diseased spot may prove the point of irritation, from which, by reflection through the nerve centre, muscles, and sets of muscles, may be stimulated into abnormal contraction.

7. In relation to the teeth, and parts surrounding, hysteria may give rise to trismus, spasm, tic, and centric odontalgia.

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8. On the other hand, local diseases of the teeth may, by reflex action, set up, when the hysterical diathesis is present, the acute hysterical paroxysm.

9. The special treatment in the first of these cases is sedative purely. In the second, removal of the irritating body is the one and the rational measure.

If, Mr President, in this Lecture I have called attention to matters which, to many practitioners, both in Medicine and Dentistry, are novel as systemized facts, and as taught facts, I make no apology, for the facts are in nature, and are to be learned in the study of nature. The more reason, therefore, that they should be both *learned* and *taught*.

MONTHLY MEETING, TUESDAY, JANUARY 4.

THE PRESIDENT IN THE CHAIR.

The following gentlemen were duly elected Members and Associates, namely—

MEMBER: James Lee Pike, Esq., Dumfries, Scotland.

ASSOCIATE: Mr W. Stuck, Camden town, London.

The usual routine business having been disposed of, the President, in the unavoidable absence of the Author, read the annexed paper on "Intense Cold, or Congelation, as a Means of producing Insensibility in Surgical Operations," by Dr JAMES ARNOTT:

It may be useful to introduce the subject of Dental Anæsthesia from Congelation, with a few observations on the subject of anæsthesia in operations generally. The advantage will thereby be better seen of substituting, on all occasions where it is practicable, local means of producing insensibility of only a small portion of the body for measures which powerfully affect the whole system; the advantages, in other words, of substituting, whenever we can, local for general anæsthesia.

More than a hundred years have elapsed since a minute account was given, in the 'Philosophical Transactions,' of the insensibility caused in dogs by immersing them in the mephitic vapour of the Grotto del Cane, near Naples. Dr Hickman recommended the inhalation of this vapour, or carbonic acid, in order to render operations painless, about seventy years afterwards, but not until Sir H. Davy had suggested nitrous oxide gas for the same purpose. The fear, however, of inju-

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rious consequences appears to have long prevented surgeons from endeavouring to revive by such inhalations the ancient practice (alluded to by Shakespeare and Boccacio) of preventing pain in operations; and it was not until ten years ago that they were actually brought into use by an adventurous American Dentist, Mr Horace Wells. A number of inhalable substances, of similar properties, have since been employed; but the vapour which has been principally resorted to in this country is that of chloroform. Although several instances of sudden death occurred from these agents soon after their introduction, it was supposed that this fatality might arise from the faulty mode of administering them; and the dread of more remote evils was completely dispelled by the publication of statistics professing to prove that it had no foundation. After no great length of time, recourse was unhesitatingly had to chloroform on every trifling occasion, notwithstanding that sudden deaths continued to occur. Familiarity with danger put an end to the apprehension of it. We had in the indiscriminate and fearless use of the new drug an instance of what Celsus calls "audacia usu ipso confirmata." Large doses were recommended in preference to the small ones originally used; and extreme debility or disease of the heart, instead of being deemed objections to the administration of chloroform, were at length spoken of as conditions in which it might be given with peculiar advantage!

Never has there existed in the practice of medicine a more pernicious error than this common and *indiscriminate* use of chloroform. Its advantage in preventing pain is palpable and immediate; its disadvantage or danger is, in most instances, latent and remote, and hence, until lately, it has been undiscovered. It certainly is not unaccompanied with the perils which probably caused the expulsion from surgery of the operation narcotics of former times; and which perils, in the opinion of many, should restrict its employment to operations attended with severe and long-continued pain.

The deaths caused by chloroform may be divided, first, into those which take place during its administration; secondly, those occurring some hours afterwards, but which, as is evident from the symptoms, are certainly the consequences of chloroform; and thirdly, those that happen long after its exhibition, and as the result probably of its having predisposed to pyæmia and other morbid affections, well known as proving fatal after the severer operations. These last, which are by far the most numerous, can only be discovered to be the consequences of chloroform with any certainty, by instituting comparisons between the amount of mortality in similar cases before and after the time of its introduction; but as they occur only after the severer class of operations, they never occur in the practice of the Dentist.

About a hundred instances of *sudden death* from ether and chloroform have been reported; but there cannot be a doubt that the greater number have been concealed. Amongst other proofs of this, it may be mentioned that six times more deaths have been published as happening in the hospitals of London, than in private practice; and scarcely half-a-dozen such accidents have become generally known in France. This evident concealment, of which every medical man must know instances, is not extraordinary; nor can it now be deemed more reprehensible than the concealment of fatal accidents from other drugs. For what family is there that would not shrink from the horrors of a coroner's inquest, where, as happens in these cases, there can be no suspicion of foul play?

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Amongst other evidence of the concealment of death from chloroform, I may allude to a statement lately made by Professor Berrier, in the 'Gazette Médicale de Lyon, that five deaths from chloroform have, to his knowledge, taken place at Lyons, and that only one has been reported. This statement is similar to one made some time ago by Dr T. W. Gardner, of Edinburgh, that, "within the three preceding weeks he had been informed of three distinct cases of reputed deaths from chloroform in Scotland, but which would probably never be noticed." ('Edinburgh Journal of Medical Science,' 1856.)

"Alarmed by these fatal effects of ether and chloroform, are we again to have our operating theatres filled with shrieks, and the unpractised surgeon unnerved by the sufferings of his patient?" By this question it has, by some, been strangely supposed that a satisfactory refutation has been given to every objection against the use of chloroform; and there is implied in it a charge of cruelty against those to whom it is directed, as if cruelty is not more manifest in recklessness about a patient's life than about his ease. Fortunately, however, if their dangerous nature obliges us to abandon the use of intoxicating vapours in the great majority of operations, we should not, in our humane endeavours to prevent pain, be left without a resource. Insensibility can in most instances (and in almost all, to a great and very useful extent) be perfectly produced, and with complete safety, by applications made to the part itself which is to be operated upon, and without the suspension of the patient's consciousness.

It is a singular circumstance, that both the general and local modes of preventing pain in operations should long have been familiarly known as capable of producing insensibility, and both avoided, on account, probably, of their supposed danger. I have already spoken of the mephitic vapour of the Grotto del Cane. Still better known was the benumbing effect of intense cold on parts exposed to it. But while the fears of the inhalation of vapours have unhappily been verified, those respecting cold have been proved to be groundless. For several years the local application of intense cold has been employed in surgical operations, not only without a single untoward occurrence, but with the immense additional advantage over chloroform of warding off that excess of inflammation from operation wounds which so often prevents their healing. It had not occurred previously to my investigation of the subject, that although long-continued congelation, such as accidentally occurs in very cold climates, will injure the more isolated parts of the body, it may, when short and regulated, be a very different process; a process so perfectly free from danger, yet so powerful as not only to produce insensibility in operations, but to constitute a prompt and unfailing remedy in many inflammatory and painful diseases.

The only reason which can be assigned for the fact that cold has not yet generally superseded chloroform in many operations is, that its proper application requires a little more skill and involves a little more trouble. Nothing can be easier than to pour chloroform on a handkerchief and hold it under the patient's nose; but it requires some practice to congeal a part properly, and some pains to prepare the frigorific materials suitable for the degree of cold required. Yet surely these reasons would have formed no barrier to its adoption had surgeons been aware of the true character of the proceeding for which cold was proposed as a substitute. A conscientious practitioner thinks not of trouble when the life of his patient is at stake, and he is anxious to learn to do that perfectly which may be of service to him.

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It is perhaps more difficult or troublesome to apply benumbing cold in operations on the teeth than in any other; but a little practice will remove this difficulty; and as the Dentist has rarely occasion to carry his congealing apparatus to the patient's house, it can be kept in good order and be more readily used.

It has not proceeded from want of sufficient evidence of its excellence that local insensibility from cold has not yet been generally adopted. There are a great many reports of its successful use in the Medical Journals of Europe and America, and in works written by the respective operators. It has been employed in the excision of tumours, in the operation for hernia, in tracheotomy, amputation of the fingers, evulsion of the nails, breaking down nævi, opening abscesses, carbuncles, and whitlows, the extraction of foreign bodies, the removal of cicatrix, and operations on the eye and teeth.

It is an interesting, though not an essential inquiry, to learn how cold acts as an anæsthetic; or what changes it produces on the vessels or nerves of the part on which the insensibility it produces depends. It retards, and eventually entirely arrests, the circulation of blood through the part subjected to it. Is the sensibility of the nerves dependent on a due supply of blood to them, and is it suspended by the stoppage of this supply? Or does intense cold act primarily on the nerves, and is this anæsthetic effect of it independent of the circulation through the part? It is probable that the insensibility is produced by these two operations of cold in combination.

In order to understand the subject better, of the application of intense cold to the teeth, it may be well briefly to describe the common mode of congealing the body in those operations which require an incision of the skin.

Congelation is generally produced by placing immediately in contact with the skin, or through the medium only of a bag of thin gauze containing it, a mixture of pounded ice and common salt. The temperature of ice is generally 32° of Fahrenheit's thermometer, but when it is mixed with half its weight of common table salt, the temperature falls to 5° below Zero; and if other salts, such as sal-ammoniac or saltpetre, be substituted for sea-salt, the degree of cold that results is still greater. When such a frigorific mixture, enclosed in a gauze net or muslin bag, is brought in contact with the skin, a certain degree of numbness is immediately produced. The skin is rendered paler than natural, but there is hardly any disagreeable sensation caused, not even of cold. In about half a minute the whole of the surface in contact with the frigorific becomes suddenly blanched, evidently in consequence of the constriction of its blood-vessels; and this change is accompanied with a feeling of pricking or tingling such as that produced by mustard. The insensibility of the skin is now complete, and will remain so for several minutes. By the continuance of the application a third effect is produced; if there be adipose matter under the skin, it is solidified, and the part consequently becomes hard as well as white. The insensibility extends deeper, and is of longer continuance in consequence of this change; and, should it last for some minutes, a redness of the skin is produced which may remain for a day or two. There is also an increase of the tingling; but unless in the most sensitive parts of the body, as the hand or lower part and front of the forearm, it is rarely noticed or complained of. Although this uneasy sensation soon subsides, there will, if the temperature of the part be not allowed gradually to return, and if the cold has reached the stage

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of congelation, be a renewal of it on the adipose matter again becoming fluid. This gradual return of the natural heat is insured by placing a little powdered ice on the part, or a thin bladder containing ice and water.

The question how far the refrigeration should be allowed to proceed, or which of the three stages just described should be reached, has been answered differently by different operators. In many of the slighter operations, either of the first stages will be sufficient, and the measure just mentioned for effecting a gradual return of heat will then be unnecessary. If congelation of the fat is produced, and the operation is proceeded with before it returns to its fluid state (which is of advantage when it is of importance to prevent bleeding), there may be required, as Mr Paget has observed, a modification in the handling of the scalpel; not only, however, is there a certainty that the insensibility both in degree and continuance will be then sufficient, whether the incision is made before or after the fat again becomes fluid, but (what is of equal importance) that antiphlogistic effect is secured, which prevents those consequences which so often prove fatal under common circumstances. On other points there have been great varieties of opinion, though probably the results have not been so varied as might have been expected. Dr Wood, of Cincinnati, and M. Richard, of Paris, use frigorifics differing from each other in power as much as 30° Fahr.; and Mr Ward applies the frigorific only for one minute, while Dr Hargrave applies it for five. Perhaps the longer congelation is continued (and it may be safely continued for double this period) the deeper and the longer continued the produced anæsthesia may be; but it were unreasonable to prolong an operation inconveniently in order that there shall be absolutely no feeling. If it should appear, however, that a certain continuance of congelation is necessary to insure its antiphlogistic power, this would be a sufficient reason for always so protracting it. It is possible that a long continuance of the first, or merely benumbing stage, may be equivalent to a short continuance of the third degree; or that a prolonged benumbing should precede the other stages; or that, in cases where it is desirable that the cold should penetrate deeply, a stronger frigorific should succeed the application of the common one of ice and salt. These are points which must be determined by future experience; but any uncertainty respecting them does not prevent our availing ourselves of the useful truths which have already been discovered respecting anæsthesia from cold.

Benumbing cold is produced by a frigorific mixture in consequence of the chemical action of the materials on each other, and during their transition from the solid to the fluid state. But it may also be produced by applying to the part bodies which have already been cooled to the required degree. If liquids or air be employed for this purpose, they must be used as a current; and perhaps such a fluid refrigerator is the best adapted for operations on the teeth.

It has been mentioned as a disadvantage of cold, that its application is painful. In parts which are naturally very sensitive, or have become so from disease, there may be considerable smarting when the third effect, or actual congelation, is suddenly produced; although even then what the patient feels is little when compared with the headache and sickness often caused by chloroform. Under these circumstances, congelation should be gradually produced; but ordinarily, there is no occasion for graduation of temperature. At first, and while partici-

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pating the prevailing opinions respecting the action of intense cold, I thought that the "current apparatus" would on all occasions be required to ensure the gradual increase and decrease of temperature;* but I have, of late years, rarely used this expedient at the commencement of the process.

The opinion that short and limited congelation would endanger the vitality of a part being no longer entertained by any one in the least acquainted with the subject, it is hardly necessary to advert to it. The fact alone, that congelation has been applied during the last five years, some thousands of times, without, so far as I am aware, the slightest effect of this kind in any case, has shown how unfounded the opinion was, and has proved that the circulation can be as safely arrested for a short period by this measure as by the pressure of a tourniquet.† Nor is it requisite to take much more notice of another objection (similar to that of certain French surgeons above alluded to), that the redness of the skin produced by congelation is symptomatic of inflammation. The truth is, that this redness proceeds from an altered state of the blood-vessels incompatible with inflammation. No spreading or persistence of this redness, no pain, no tendency to suppuration—in short, none of the concomitants or consequences of inflammation follow the application of intense cold; and the speedy healing of the wound is conclusive evidence that this morbid condition certainly does not exist. On the contrary, so far from having this consequence, there is little doubt that, however valuable intense cold may be as an anæsthetic, it is as an antiphlogistic that it will chiefly be prized, or as a means of preventing or immediately subduing, with perfect safety to the patient, every inflammation within its reach. I have elsewhere adverted to the importance of this remedy in military surgery; and shall now merely observe, that its promptness of action will not only render it of great value after gun-shot wounds and other mechanical injuries, but will enable the surgeon speedily to quell various other inflammatory affections to which soldiers are subject, and which at present render them long unfit for duty. It has been asserted that on one or more occasions the gum has

* See the Author's 'Treatise on Indigestion: with an Account of an Improved Mode of applying Heat or Cold in Irritable and Inflammatory Diseases,' Preface, page viii.

The current apparatus is a convenient mode of graduating the temperature, and especially so in operations on the teeth. Dental anæsthesia has, accordingly, generally been produced by instruments constructed on this principle. The advantage of graduating the temperature is mentioned in a paper on Congelation in the 'Lancet' for July 1848. The current apparatus was described in the same Journal six years before.

† If there be still amongst English surgeons, any believers in the old doctrine on this point, I would refer them to a very interesting Report just published of the highly beneficial use of frigorific mixtures in diseases of the uterus and skin by M. Aran, Physician to the Hospital St Antoine, in Paris. In the course of this Report the following apposite remarks occur: "L'école contemporaine tend à abandonner de plus en plus les idées anciennes sur les dangers de l'emploi du froid. Les expériences physiologiques ont déjà fait justice des craintes chimériques conçues à cet égard. Ici encore nous voyons un froid intense, de 20° au dessous de zéro environ, agir sur une surface malade pendant un quart d'heure, au delà duquel des compresses d'eau glacées sont encore appliquées sur elle. Que se produit-il à la suite? Une gangrene? Nullement. Une réaction très intense, dangereuse par son intensité même? Pas davantage. Quelques heures suffisent à dissiper l'orgasme local excité par l'application du froid."—'Gazette des Hôpitaux,' November 16.

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sloughed after congelation in dental surgery. What has been termed sloughing was probably only desquamation of the cuticle. A small portion of the skin has often been kept in a frozen state for an hour without permanent injury to its texture; and it is unlikely that the gum should suffer more, even were it kept congealed for a much longer period than can ever be necessary.

The objection to congelation, that it is not a complete or perfect measure, is the weakest that has been offered, and can refer only to the deeper incisions of the surgeon. To refuse to employ congelation in any operation because, in some, the insensibility produced by it is incomplete, or not to employ it in those that are deep-seated when chloroform is rendered unusually dangerous by the presence of organic disease, would be very absurd. For what is there complete or perfect in medicine? Chloroform is, even in this respect, far from being complete, as is obvious from the struggles, under the knife, of the patient who has taken it; but would it be justifiable for this reason to exchange the stupor caused by this kind of intoxication for the complete insensibility caused by fainting, as suggested by Mr Wardrop, or by concussion of the brain, as practised in the shambles? Is the danger of the patient to be deemed of no account?

There is nothing in the history of medicine more extraordinary than the common opinion on this point. Would the use of opium, or any other of our most valuable drugs, have been persisted in, if so many sudden deaths had been caused by it in so short a period as have been the effects of chloroform, notwithstanding that the objects of their administration are much more important than the prevention of what is often only a slight or endurable degree of pain? How are we to explain so strange an anomaly? The practice of giving chloroform having become so common, and habit or familiarity having reconciled us to it, as it will to the worst practices, the answer to this question does not immediately present itself; but it can hardly be doubted that this solitary exception to the humanity which pervades the medical art has been the consequence of the rashly confident representations of the safety of chloroform made by parties whose interests were promoted by introducing it, and by those who, because they have not as yet had the misfortune of causing death by it, pride themselves on the fallacious supposition that *they* can wield with safety a weapon which is dangerous in other hands. It is said that patients are more anxious than their surgeons that chloroform shall be used, and, as they may have been assured that there is no danger from its use, the allegation is probably correct: but if they were told (and it is criminal to withhold the information) that although chloroform is dangerous, most operations can be rendered altogether painless, with perfect safety by other means, and that the more acute and injurious portion of pain attending those deeper operations that remain, would be prevented by the same means, there can be no doubt about what their decision would be. They assuredly would not, by taking chloroform for so insufficient a reason, or no reason at all, yield up their consciousness or intellectual life for a period to be determined by by-standers, and with the uncertainty of ever regaining it in this world.

Nor is it probable that a conscientious practitioner, after he has become acquainted with the anæsthetic powers of cold, will unnecessarily place his patient in so unpleasant a condition, or expose him to so fearful a chance. The extraordinary argument so often brought forward, that only a small number of those who inhale chloroform are

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killed by it, will have no weight with him. Why should one person be thus needlessly sacrificed? Is the professed preserver of human life to be permitted to put it in jeopardy without sufficient cause, or without the apology that the hazard is necessary to ward off the evil of great pain? Were there no other way of avoiding this evil it might be allowable to incur such a risk, for severe pain may produce exhaustion, and other injurious effects, but in those cases in which pain of this degree may be safely prevented by cold, it would be extreme rashness to endanger life by chloroform.

If common humanity will not prevent the surgeon from thus needlessly hazarding the life of his patient, a regard for his own interests may be more effectual. His temerity would be generally condemned; and if he should cause death in doing that which he knows, or ought to know, can be otherwise done with perfect safety, he would subject himself to a very serious charge. That a surgeon could now, for the fifth time, cause death by chloroform in the extraction of a toe-nail, with impunity, is very unlikely; for it is impossible any longer to conceal the fact, that its exhibition is dangerous, and ought not to be had recourse to without necessity. The public are not to be deluded by the assertion that the fatal effects of chloroform have been the result of want of care in its administration, for they have seen it fatal in the hands of the very parties who have told them this, as well as in those of the most skilful and experienced. The reported number of its victims already exceeds sixty, and there is not the slightest doubt that this list is far from being complete; of its many injurious consequences of a minor degree no record is kept.

Dr Arnott's paper having been brought to a close, Mr Williams, by request of the President, gave his experience in reference to the value of congelation in the extraction of teeth, as follows:

Mr. President and Gentlemen,—Having been, as many of you know, daily occupied for some time in the use of congelation as an anæsthetic in tooth extraction, I am sure you will allow me to make a few remarks on the present occasion. I am very happy to bear testimony to its value for that purpose, and it is my firm impression that congelation is destined at no very distant period to form one of the most important aids to medicine and surgery which has ever occupied the attention of the scientific world. And when we shall be fully alive to its merits, then will the name of Dr Arnott be held in grateful remembrance both by physician and patient for his untiring perseverance in proving the truth of this principle in spite of much opposition and prejudice. Yet with characteristic generosity he has freely given to all who choose to take it, in his published works on the subject, the benefit of his experience, without attempting to secure to himself all the advantages which would arise from the practice of it, and he has abundantly proved that many intractable maladies can not only be checked, but cured by it, where all other known means have failed, and that much pain can be avoided by its aid in otherwise painful operations. He by no means insists upon the employment of congelation to the exclusion of other well known and approved agencies in the treatment of disease, but urges its advantages in conjunction with these wherever their uses are indicated.

I ought to say, however, that there are some disadvantages in our present means of applying congelation for anæsthesia in tooth extrac-

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tion in our every-day practice, which may perhaps, by-and-by, be overcome by improvements in our apparatus. I may mention, as one of the objections to its general use, the length of time required to conduct the case successfully where difficulties exist, such as the tooth being in a bad position in the mouth, that is, in one where it is difficult to get the membrane fairly over it; this we find generally in the lower jaw, where, too, we get an accumulation of saliva, which, as it were, bathes the membrane in warm water and resists the freezing power. Dr Arnott has, however, kindly given me a suggestion whereby I hope to be able to remove this difficulty, or at all events to lessen it. We seldom meet with these obstructions in the upper jaw, and as a rule, can make sure of a successful operation. The question as to congelation being a safe and certain anæsthetic under favourable circumstances is a settled one, which the great number of cases in which it has been used fully proves; and that it can be used from beginning to end without an atom of pain I positively assert from my own experience; and that it sometimes fails, is only in keeping with the laws which govern all things human, perfection being unknown, however desirable it may be to get as near to it as we possibly can.

It is also troublesome in cases where there is a great amount of inflammation surrounding the tooth, to subdue which it requires a longer cooling down and application of the freezing temperature; besides, in such cases, the first change of temperature is apt to be felt, but I should mention that, if felt, it is almost as a rule, only for a brief period, until you pass a certain point, beyond which you may continue the freezing to any required length of time without further inconvenience. I have sometimes, however, thought it the wiser plan to let down the intensity of the cold at once, allowing the aching from that cause to be felt for a brief period, otherwise the operation may be continued a long time, and you may not be able to pass that point without the cold being felt, at all events, disagreeably.

Congelation, as applied to tooth extraction, has the great merit of being perfectly free from danger. It is a mistake to anticipate difficulty on that score, vitality of the frozen part being but suspended, not destroyed. Our chief difficulty with the common mixture of ice and salt is in getting power enough to subdue the sensibility with rapidity, in some cases, at least, that has been my experience. You may intensify the cold by the addition or substitution of more powerful frigorifics, which, however, I have never thought it advisable to employ, because the ice and salt is generally sufficient for our purpose, and with some of these it is possible congelation *may* be carried too far.

The great question which seems to arise in the professional mind is, whether an anæsthetic in tooth extraction is, in the majority of cases, worth the necessary time, trouble and expense. But we all know that there are some patients who go on suffering with diseased teeth from year to year, to the great detriment of their health, from dread of the operation. To such patients I say that congelation is an invaluable boon, and whenever an anæsthetic is demanded, it is the safest and best with which I am conversant.

Mr Williams then explained the action of Blundell's patent apparatus which Mr Thornthwaite had kindly sent to the college at his request; and said he should be happy to answer any questions on the subject from

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the members present, or at any other time at his own residence, and to afford them any information in his power.

Various questions having been asked and responded to—on the motion of the Chairman, a cordial vote of thanks was unanimously passed to Dr Arnott for his paper, and to Mr Williams for his explanations, after which the meeting was adjourned to Tuesday, February 1.

THE ANNUAL GENERAL MEETING OF THE COLLEGE OF DENTISTS.

The Annual General Meeting of the Members of the College of Dentists was held on the 27th ult., at the Rooms of the Institution, No. 5 Cavendish square, for the purpose of receiving the Report of the Council, and of electing the Council and office-bearers for the current year.

The PRESIDENT having taken the chair shortly after seven o'clock, declared the ballot to be open, and the votes for the election of the various office-bearers of the society were received during the hours specified in the rules for that purpose.

Mr S. L. RYMER read the following Report of the Council, detailing the proceedings of that body, and many passages in it were very warmly and unanimously applauded.

In accordance with one of the provisions of the 17th constitutional law, the Council of the College of the Dentists beg to present the members with a Report of the proceedings of the College during the past year.

In performing this duty, it is felt by the council that they are not called upon to comment upon the events of the twelve months just elapsed, but simply to record those events as they occurred.

On the occasion of the first annual general meeting in

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January 1858, certain resignations from the council were made known as having taken place on account of the rejection of the terms of amalgamation with the Odontological Society, but the gentlemen whose resignations were announced consented to retain their seats on the understanding that negotiations in regard to the amalgamation should be renewed, and the appointment of the new council was postponed for a time. On March 4th, a special general meeting was held to reconsider the amalgamation terms, when it was decided that it would be illegal to entertain them, because they were brought forward in precisely the same form as on the previous occasion, whereupon several office-bearers again resigned their positions. This caused a difficulty in filling up vacancies in the council, to meet which an independent committee of five members was appointed at a special general meeting of members on March 27th, to nominate for the vacancies. The labours of this committee resulted in the election on the 21st May of the present council and officers.

The new council, upon their appointment, found themselves in a position requiring the utmost caution in the direction of the affairs of the College. With every desire to secure unity of action, it was determined to ascertain whether an amalgamation was possible on equal and honourable terms. Such a desirable end was found to be impossible. The council immediately resolved to carry on the business of the College steadily and perseveringly, but without giving just cause of offence to their fellow-practitioners, whether members of the College or not, regarding such a course as the one most likely to bring about that unity of the profession they firmly believe will eventually be accomplished.

The necessary revision of the laws of the College claimed early attention from the council. A committee was appointed to confer upon the required alterations and additions. After many protracted sittings, this committee gave in a report to the council, by whom the important reforms recommended in the laws were considered and approved, and finally a special general meeting of members was convened for July 16th, when such reforms were adopted with some modifications, and a copy of the laws, as amended, was forwarded to every member and associate.

The importance of adopting fixed regulations in regard to the conditions of membership was next taken into consideration by the council, and a curriculum was agreed upon which received the approval of the members on September 22nd, whose opinions upon the question were generally invited, vote by proxy for country members having been adopted. A

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copy of the regulations here referred to was sent to every member and associate.

During the consideration of the Medical Bills before the late session of Parliament, which eventually resulted in the passing of the "Medical Act (1858)" the council were carefully engaged in opposing the insertion of any clause tending to prejudice the interests of the College of Dentists. They were also engaged in an endeavour to obtain the recognition of Dentists as a professional body in the new Act. Both these results were accomplished. The portion of a clause in Mr Cowper's Bill which would have operated most injuriously against the College was struck out, whilst the claim of Dentists generally to the right of legally recovering charges will be found allowed in the last clause of the Medical Act.

With regard to the ordinary monthly meetings, the "Transactions" of the College (about to be forwarded to the members and associates), will show that at every such meeting the proceedings have been of an instructive and interesting nature, and the council desire now to give expression to their sense of obligation to the many gentlemen who have come forward so readily to give the result of their experience and observation in the valuable papers prepared by them. A desire having been evinced by several members that the "Transactions" of the College should be published quarterly instead of yearly, the council have arranged to meet this desire, and in future a copy of the "Transactions" will be transmitted to each member and associate every three months, commencing in April next ensuing.

Towards the close of the year a very general attention was directed to the public statement that electricity could be rendered available in procuring the painless removal of teeth. The interest aroused in the profession by such a statement was naturally great, and in accordance with a requisition received by the council, a special meeting was convened for October 12th, to discuss the value of electricity as an anæsthetic, with the view of testing its merits in dental operations. The subject being one of great importance to the scientific world generally, admission to the meeting was accorded to all professional men taking interest in the question. Thus many eminent medical practitioners were present to assist in the proceedings, as well as a very large body of Dentists. On the motion of Dr Elliotson, the Council of the College of Dentists were requested to nominate a committee to fully investigate the subject, and to report thereon at a future meeting. This request has since been carried into effect so far as a committee

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is concerned, whose report will shortly be brought before the profession.

To those acquainted with the troubled position of the profession during several months in the past year, it will scarcely be matter of surprise that the educational objects of the College have not been more fully developed. Indeed, it was only through the earnest attention of the council to the interests of the College, that the delivery of lectures of the highest character was commenced in November last, when they had the gratification of securing the valuable services of Dr Richardson, whose lectures on the Medical History and Treatment of Diseases of the Teeth are now in course of delivery.

The members severally have been furnished with a prospectus of these lectures, and it is therefore needless to add that important subjects are embraced which have never before received consideration, whilst the fact of these subjects being treated by an eminent authority must be a source of satisfaction alike to members of the College and the profession generally.

In conclusion, the council would cordially acknowledge the support which has been accorded them by members generally, during their term of office, without which support, indeed, their efforts to carry on the business of the College with success would have been impossible.

(Signed) PETER MATTHEWS, President.
S. L. RYMER, } Hon. Secretaries.
A. HOCKLEY, }

Council Room, 5 Cavendish square,
London, January, 1859.

The CHAIRMAN: Before calling upon Mr Purland for his Report. I think it desirable that we should deal with the document which has just been read, and then I shall have the pleasure of laying before you the statement of the Treasurer. There are many important matters touched upon in the Report of the Council, at which I shall take a cursory glance, for, owing to the position I have held of president of the College, I may be allowed to speak of your council—they cannot speak of themselves. [Hear, hear.] Twelve months have elapsed since I took the chair, at a time, as you must all be aware, when the College was in great difficulty. You will recollect that a portion of the council resigned their situations in consequence of the differences which arose out of the amalgamation question. It is almost needless for me to speak upon that subject again, and I would not do so, but that another society has thought proper to allude to it, and to state publicly and distinctly that we would not amalgamate with them. That statement is utterly erroneous. We were

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all willing to amalgamate, but it was with relation to the terms on which the amalgamation should take place that we were unable to agree; for the other party proposed and insisted upon terms which were not acceptable to the majority of the College. [Hear, hear.] In the first place, they wanted to alter our name; but their principal object was to force us to go to the College of Surgeons for a diploma. Now this College was founded as an independent institution [cheers]; and you may rest assured that the future will show that what we have begun well will be faithfully carried out—if not by ourselves by others. That there will be an independent institution after all, I feel satisfied, for I am fully persuaded, and I speak not without good authority, that the College of Surgeons will never grant a dental diploma. [Hear, hear.] You will recollect also that the council resumed their places at the request of a public meeting of the body, in order, if possible, to bring the amalgamation question to a successful issue, with instructions that the terms should be modified so as to be agreeable to the Members of the College. They resumed their position; but again the same terms were brought forward with no modification whatever, and the consequence was—as the terms were identical with those that had been already rejected, that the College could not entertain them again. Those members of the council then finally resigned, and the present council was elected. The duties of the new council during the past year have been, I need scarcely say, of a very arduous character, deserted as they were in the hour of need by their old friends. I say "old friends," because we were in concert upon everything but that one point of the amalgamation, and it was a great pity that our former coadjutors should have resigned, and have thus severed old friendships, because I am persuaded that if they had remained with us the amalgamation might have been carried out with satisfaction to all. [Hear, hear.] But they having left us, I have been informed by a member, upon whose veracity I can rely, and on whose authority I can speak, that it was the determination of the Odontological Society not to amalgamate with the College of Dentists. They proposed terms which they knew that we, as an independent body, could not accept. They were anxious to obtain the strength and the position which our numbers could give to them, in order that they might go in a large body to, and, by our aid, produce an effect upon the College of Surgeons; but in their heart they had no wish to amalgamate. [Cheers.] Your new council, then, gentlemen, had great and arduous duties to perform. Their first desire was to see whether the amalgamation could not still be brought about. You know that; you know how sincere and earnest their desire was upon that subject, and you know also that their efforts were unavailing. [Hear, hear.] Then a small committee was appointed from amongst yourselves, to see if unity could not be re-established. We have had no report from that

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committee, and therefore, I presume, that their efforts fell to the ground entirely. Indeed, it seems to have been determined by the other side that they would not amalgamate on any terms whatever. That being so, your new council felt that they had nothing to do but to look to your interests, and I must say that a harder working council, or a council which looked less to their own interests, and more to the general interests of the College, you could not have had than that which have served you so faithfully for the past year. [Applause.] Their meetings have been many, but not too many, considering the importance of the objects which they had in view. In the first place, there was that great and momentous bill which was brought into Parliament, and which was known as the "Medical Bill." When the council perused that bill, they found that the profession of the Dentist was not recognised at all in it. There was no mention made of Dentists any more than if we were a non-existent body; and the first object, therefore, of the council was to place themselves in communication with the head of the department, and to request that Mr Walpole, the Home Secretary, would receive a deputation from us on the subject. Mr Walpole stated, in reply, that his engagements were very numerous and very pressing, and he added that if we would embody in a paper a detailed statement of our wishes, he would endeavour, if possible, to accede to our views. Consequently your council did send in an account of what they wanted, which simply was, that Dentists should be recognised in the Bill. He very readily assented to our wishes in this respect, and as no objection was raised by Mr Cowper or Mr Headlam, they were fully realised, and you will find that Dentists are included in the Bill. [Cheers.] I mention this because it is a fact that that important object was accomplished by the College of Dentists—it was the College that did it. [Cheers.] The Odontological Society did not request that, and although in their publications they seem to intimate that it was their desire that the Dentists of England should be recognised, the fact, is, that it was the Council of the College of Dentists of England who alone achieved that object. [Cheers.] They watched the Bill in its progress through the Committee of the House, and they saw that a clause was about to be introduced conferring power upon a body calling themselves the "British College of Dental Surgeons," to examine candidates, and to grant diplomas. That proposition emanated from the Odontological Society, who wanted to establish this new body in order to destroy us. Your council found that out, and owing to their exertions that clause was struck out, it being considered that whilst there was a College existing, there was no necessity for introducing into the Act one that did not exist. And it is a curious fact and worthy of note, that the title the "British College of Dental Surgeons," was the very name which we proposed to the Odontological Society that we should assume, if

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our present designation was altered. They would not agree to that name at the time, and yet it is the very one which they proposed for the new College, which they were anxious to call into being to subserve their own ends. [Cheers.] I am happy to say, that Members of Parliament, most of them, are men of reasoning faculties; they can see what is right, and if their attention is directed in the proper course, they are quite able to judge for themselves. Accordingly they found that a clause which was about to be introduced, was one that was not required, and it was struck out immediately. They succeeded, however, in introducing a clause in which I see no harm, to the effect, that the College of Surgeons might establish special examinations for granting dental diplomas. I believe that the members of the medical profession generally opposed that provision heart and soul. When they waited upon Mr Walpole, they were told that it would never be done by the College of Surgeons; and the Odontos observed, that in that event they would form themselves into an independent body for the purpose—the very thing that you have been from the commencement. [Cheers.] It would appear, therefore, that they are following in our steps. Another step that they have taken, is to establish a dental hospital—a very excellent thing. [Hear, hear.] We considered that same subject two years ago, and a committee was appointed who reported upon it, but when it was brought before the council, they thought that one dental hospital was sufficient, and that it would be better not to establish another institution, in a spirit which might have the appearance of hostility or opposition. Therefore your Council abandoned the idea. I tell you this because it may not be generally known, but it is the fact. Now, the Council have endeavoured during the past year to avoid giving offence to any individual, or to any set of individuals. [Hear, hear.] The proceedings of the Dental College have had no reference whatever to the Odontological Society, or to their movements. We have pursued the even tenour of our way with a view to the best interests of the profession at large. We have invited men of skill and men of eminence to come before you to read papers, and to lecture, and to do all in their power to advance the great objects which we have at heart; but I am sorry to say that the other party, aided, I fear, by those who have seceded from us, have done all in their power to thwart us in our good intention, and to render our exertions of no practical avail. It is painful to dwell upon these topics, but I must speak forth the words of truth and soberness, for the crisis has come, and I must tell you that which I do know. [Hear, hear.] In the position which I occupy as your President, I naturally hear much that is going forward. We have done everything to court inquiry; we have striven earnestly not to give offence; but whenever we have endeavoured to accomplish any good for you, the other

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party have come in, as it were, like an enemy in the dark, and have tried to place an embargo upon our good designs. For example:—I waited upon a very eminent gentleman, a lecturer upon anatomy, and I asked him if he would give us half a dozen lectures upon the anatomy of the head and neck. He agreed to do so, and said that he should be most happy to do anything to assist us. Soon afterwards he wrote me a letter wishing particularly to see me. I obeyed his summons, and he then informed me that the polemic nature of the profession was such, that he should be obliged to abandon the intention of giving these lectures. He said that he should have been very happy to have delivered them, but that he had been told by the other party, that it would be against his own interest if he did, and of course he was obliged to take care of that first. [Cries of "shame"!] I could mention names, but I think perhaps I had better not in this public room. If I should be called upon, however, by any member to do so, I shall be quite ready and willing to give the name of that gentleman; but in this public assembly I think that I had better not. [Hear, hear.] I then looked about for some other gentleman of ability who might be induced to lecture to us, and knowing Dr Richardson to be a very eminent man, who had gained the 300 guinea prize for his Essay on the Blood, and who is an excellent writer, and the Author of many valuable works which I have read with a great deal of pleasure, I waited upon him, and asked him, as there seemed to be a dearth in the matter of guides to Dentists, whether he would lecture to us. I say a "dearth in the matter of guides to Dentists;" for after all it is a fact, that if you read dental works, there is very little gained as to the surgical treatment which is often required. [A voice, "We are all in the dark"!] Just so; and Dr Richardson states, that in these perusals of Dental literature, one could gain little information upon medical and surgical points. This, however, is *par parenthese*. As I have said, I waited on Dr Richardson, to ask if he would give us a few lectures, and he met me with that very happy and cordial spirit which I am sure every liberal-minded member of the profession would always exhibit. [Cheers.] He said that he would do so most gladly, and he appointed a time when we might together draw up the heads of those topics which we thought would be interesting and useful to the profession. We prepared a syllabus of the twelve lectures, and those who have attended the course must, I am sure, have been delighted with the manner in which they treat of every subject connected with ourselves. But every opposition in this matter was not suppressed, for the idea of evil consequences to himself for the simple act of affording us instruction, was insinuated to our Lecturer, though without effect. [Cheers.] I must give you one other instance to illustrate what is the feeling of the adverse party. As you are aware, many gentlemen of high reputation in their profession have taken

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great interest in our electrical meetings, for we have had present at them Dr Elliotson, Dr Richardson, Dr Lawrence, Dr Arnott, Mr Harry Lobb, and others, who have assisted us in our experiments. One gentlemen, a member of the Royal College of Surgeons and a highly respectable member of the medical profession, who has evinced much interest in our proceedings, said to me the other day, "A member of the opposition has written to me, endeavouring to persuade me to have nothing to do with the College of Dentists of England, saying that it will be rather against my professional career if I do anything for them." I said, "Well, what's your opinion on the subject?" He said, "I don't know what to think of it; the person who writes to me never did anything for me that I am aware of, but I have been threatened that it will be against my advancement in my professional career if I take any part in your proceedings. I have taken no notice of it, however; I have experienced nothing but gentlemanly treatment and courtesy from the College of Dentists; and whilst that continues, I feel bound to support everything that may tend to the honour of the profession at large, and that may be useful to its members; therefore I shall render you all the service in my power." [Cheers.] These are some of the facts that have come before us. Facts are stubborn things, for, like figures, they indicate nothing but the truth. But, bad as these things are that I have detailed to you, it is not all that they have done; for it is my firm belief, that there is not one member of the profession whom they consider to be of any standing, with whom they have not communicated, in some way or other, for the purpose of crushing this College. They themselves have stated in print, that their only object is to crush us. [Shame!] I need not allude to their monthly publication in which they have spoken of us in a manner which, in my opinion, reflects only discredit upon themselves. [Cheers.] Nor need I tell you how much so humble a person as myself has been pelted and sought to be degraded by their attacks. I am happy to tell you, however, that their shafts have not hit the mark, for I am not so thin-skinned as to take all to heart that they have said. [Cheers.] It is written in the Book which we all revere, about a certain people, that the more they were oppressed, the more they throve. Don't suppose, therefore, although I have been so severely thrust at, that I am much injured by what they have done; I believe firmly, that their attacks will recoil upon their own heads, for I am satisfied that in the opinion of all honest men who have read their publications—one most infamous one in particular—the effect will be to injure themselves, rather than those at whom the stone is thrown, because anonymous. [Cheers.] We can bear insult at times, because we know the little mind whence it springs; but when injury is added to insult, it is a coin that will be put out to compound interest, to be repaid some day in full of all demands; and the time may come

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when this will not be forgotten. [Loud cheers.] I hope you will excuse the time I am occupying; but I must not conceal anything, for it is my duty, as your President, to tell you truths. I have spoken of the Medical Bill, and of the opposition which we have experienced from the other party; and now I must inform you of what we have been doing in regard to our membership. [Hear, hear.] I fear I am bound to say, in candour and in honesty, that those gentlemen who have seceded from us—those who were our friends once—have shown themselves to be our greatest enemies now. They have exercised their influence both with the tongue and with the pen, and they have succeeded in depriving us, not only of their services, but of many of our members. I am bound to say that you will find that many members for the last year have not paid up their subscriptions, so that, virtually, they are no longer members of the College. Under these circumstances, I think that the time has come when your future Council, whoever they may be, ought to call you all together to a general meeting, and take your opinion as to what should be done in the present state of affairs. I think that it is my duty, in the position which I occupy, to tell you so; and I must also announce to you, that from this day forth, I cease to be your President. I resign that office this evening. I consented to act in that capacity *pro tempore*. I have redeemed the pledge I gave, and now that the time for election has come round again, I resign the trust into your hands. I have been nominated for the same honourable office, but it is my sincere and firm determination not to occupy the presidential chair again. If you like to elect me, I shall be happy to continue to act as your treasurer, and to serve upon the council; but I think that you can go on very well without a president. [No, no.] Those who are trying heart and soul to crush you have succeeded in inducing many eminent men to retire from the Society, and under those circumstances, it is for you to consider whether you will continue as a College, or how you will act. Of that, I think you are the best judges. In the multitude of councillors there is wisdom; therefore, the sooner that is done, the better. I do not consider that two rival bodies of Dentists can exist together, and I should be very sorry to offer any opposition to what may be called "unity" in our affairs. The existence of the Odontological Society and of the College of Dentists as separate and rival institutions, very likely prevents many outsiders from joining either; and if one gives way, the probability is, that what we intended to carry out may be accomplished to the full extent by another party. But that is for you to decide. I am sure that you will not come to a hasty conclusion upon so weighty a matter, but that you will give it the deliberation that its importance demands. Then, when you are called together in general meeting, every member can express his opinion; and whatever you do, I trust, above all things, that you will endeavour to be unanimous. [Cheers.]

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This, gentlemen, is a rough sketch of our proceedings during the year. I have said, perhaps, more than may be agreeable in some quarters, but I could say much more. Without further preface, however, I beg to move, "That the Report, which has been read by the Secretary, be adopted, and that it be printed and circulated amongst the members." [Cheers.]

The motion, having been seconded by Mr FINZI, was carried unanimously.

Mr PURLAND read the Librarian's Report, which was also unanimously accepted. It was in these terms :—

I have the satisfaction of laying on the tables before you the Books and Dental Curiosities I have had the honour to receive from our Members on behalf of the Library and Museum of the College of Dentists of England.

That they are not more numerous is no fault of the Members, inasmuch as their liberality, in the first year of our existence, was so much in excess of what we had any reason to expect, that I think we may feel proud of our collection; which embraces almost every department of Dental Science—both Mechanical and Surgical; and I venture to assert that very few societies of three years' standing can make so goodly a display, a display at once pleasing, curious, and instructive.

BOOKS FOR LIBRARY.

The Quarterly Journal of Dental Science, for July and October, 1858; by the Proprietors. On the Climate of Apsley Guise, by Dr Williams; by the Author. On the Local Application of Benumbing or Congealing Temperature in Inflammatory, Painful, or Malignant Diseases, by Dr Arnott; presented by the Author. On the Expediency of Instituting an Academy of Medicine in England, illustrated by the Prevailing Opinion and Practice respecting the Use of Chloroform in Operations; by Dr James Arnott. Directions for Using Dr James Arnott's Current Apparatus; by the same. Dental Anæsthesia, by Mr R. Quinton; presented by Mr Edwin Williams. The Quarterly Journal of Dental Science, No. VIII; presented by the Proprietors, Dental Review, No. I; by the Proprietors. Reports of the Mesmeric

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Infirmary, 36 Weymouth street, Portland place, for 1855-6-7-8; by Dr Purland.

MUSEUM.

A Bellows Blow-pipe of novel construction; invented and presented by Mr Humby. A very useful and ingenious Blow-pipe for the mouth; invented and presented by Mr Jordan. A very fine specimen of Osseous Union; presented by Mr Humby. An improved Matrix for Striking Plates; invented and presented by Mr Jordan. Eight specimens of Exostosis; presented by Mr Harley. Six specimens of Calcareous Deposit; presented by Mr Harley. Specimen of Mineral Teeth; T. Purland. Antient Cupping Instruments: T. Purland. Early French Mineral Teeth; T. Purland. Specimens of Comparative Dental Anatomy; T. Purland. Antient Roman Skull; T. Purland. Eight Cards illustrative of Comparative Anatomy; T. Purland. Six specimens of Antient Instruments. T. Purland. Antient Roman and Saxon Jaws; T. Purland; Twenty-three Teeth, a part of a large collection, extracted without the slightest pain in the mesmeric trance; T. Purland.

I beg to call your particular attention to the ingenuity displayed by Mr Jordan in his method of striking plates where the teeth are much undercut; to Mr Humby and Mr Jordan's blow-pipes, and also to the very curious collection of casts of injuries and reparations in the mouths of some of the brave men who have shed their blood in their country's cause.

These casts have been presented by a zealous member of your council, Mr J. C. Smith, of Chatham.

THEODOSIUS PURLAND, Ph. D., M.A.,
Curator and Librarian.

THE CHAIRMAN then read the Report of the Treasurer, explaining the various items as he proceeded. It was as follows:—

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The Treasurer in Account with the College of Dentists of England.

1858 Dr. Cash.	£	s.	d.
To Entrance Fees and Subscriptions	359	2	0
	359	2	0
December 31st, 1857. Balance in Treasurer's hands	353	10	6
	712	12	6

1858 Contra. Cr.	£	s.	d.
By Printing	74	15	4
Stationery	6	0	4
Postage and envelopes	40	15	6
Rent of premises	125	0	0
Advertisements	24	9	10
Clerks	6	7	6
Reporters and transcripts	33	10	0
Return of Entrance fees and Subscriptions	6	6	0
Lecturers	37	16	0
Periodicals	1	2	5
Porter's wages	15	0	0
Repairs: Cabinet-maker, carpenter, and gas-fitter	3	15	6
Wine for lecturers	2	8	0
Sundries, including gas, cab-hire, &c.	6	8	2
	383	14	7
December 31st, 1858. Balance in Treasurer's hands	328	17	11
	712	12	6

Audited and found correct { Henry Faulkner. / Robert Thompson.

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The accounts had been audited, and found correct; and they had been certified to be so by Mr Henry Faulkner and Mr Robert Thompson. [Hear, hear.] The question, he added, might very naturally be asked, in the present state of their affairs, how many members did they now number? He anticipated the question, and therefore he might as well answer it at once. There were 171 members who had not sent in their resignations, and who had paid their subscriptions for the past year. [Hear, hear.]

Mr THOMPSON: As one of the auditors who has certified to the accuracy of the accounts presented by our excellent Treasurer, I beg to move the adoption of the Report which he has just read. After the very lucid and ample explanation with which he has favoured the meeting, I do not think that it is necessary for me to supplement his remarks by a single word. I should indeed have been glad if our members had been as numerous now as they were last year; but under the circumstances I think that we have some reason to congratulate ourselves that we are so numerous as we are, and that so many faithful have been "amongst the faithless found." [Cheers.] I beg to move "that the Report of the Treasurer be received and adopted."

Mr HUMBY seconded the motion without verbal comment, and it was carried unanimously.

A long discussion then ensued upon the question whether the above Reports should be printed in a separate form and forwarded to the members, or whether the Editor of the DENTAL REVIEW should be requested to publish them, and copies of that periodical should be sent to every member. On the one hand it was urged that if the latter course were adopted it would be said by the other party that it was an attempt to tamper with the freedom of the press, and to bribe the proprietors of the REVIEW to advocate their cause. On the other it was contended that so much abuse had been heaped upon them by their opponents that they could bear a little more, and that in fact it mattered nothing what they said. The REVIEW was a very ably-conducted paper; if it advocated their views its services deserved to be recognised, and by forwarding it to all the members it might be brought perhaps under the notice of some gentlemen who were at present unaware of its existence. Ultimately, to bring the question to an issue, Mr PURLAND moved and Mr WEISS seconded a motion to the effect that the Report be published in the DENTAL REVIEW, and that a copy be sent round to every member; whilst Mr PERKINS moved, and Mr CUNNINGHAM seconded, as an amendment, "That the Reports be printed and circulated in the usual way." So nicely were opinions balanced upon the question, that upon a show of hands being taken an equal number was found to be held up for the motion and for the amendment. The Chairman, being called upon for his casting-vote, gave it in favour of the motion, observing that it matters little

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what their detractors said against them, so long as they possessed the *mens conscia recti.*

The motion was then carried, Mr Rymer adding that the DENTAL REVIEW was in the hands of a perfectly independent gentleman — a man of great ability, who would stand no dictation either from that College or from any other party. [Cheers.]

The Chairman, accompanied by Mr Rymer, one of the honorary secretaries, and by Mr Finzi and Mr Stoddart, the scrutineers, then quitted the room to examine the ballot-box, Mr Harley taking the chair in the interim. On their return Mr Matthews resumed the chair, and gave the result of the poll as follows :—

President—

Vice-Presidents.—Messrs J. Harley, W. Imrie, T. E. Rose.

Treasurer.—Mr Peter Matthews, 17 Lower Berkeley street, Portman square.

Council.—Messrs J. Bate, J. B. Bell, E. Bevers, D. J. Brenneis, W. Broadway, W. L. Canton, H. Faulkner, T. H. Harding, W. Imrie, jun., H. T. Kempton, W. Perkins, H. L. Spencer, J. C. Smith, F. Weiss, E. Williams.

Honorary Secretaries.—Messrs Samuel Lee Rymer (Council); A. Hockley (Corresponding); Theodosius Purland (Librarian and Museum).

THE CHAIRMAN: I declare those gentlemen whose names I have read to you to be duly elected as office-bearers for the current year; but with regard to myself I do most positively and respectfully decline longer to occupy the presidential chair. I shall now be happy to hear any remarks which any member may have to make, or to answer any questions which may suggest themselves.

Several gentlemen having expressed a hope that Mr Matthews would not retire from the office of President,

Mr HARLEY moved and Mr HUMBY seconded "that Mr Matthews be solicited to retain the presidential chair until his successor be appointed."

THE CHAIRMAN thought that they could hardly force this upon him; whenever they chose to elect him as chairman of any particular meeting he should be happy to undertake the duties, but of their list of vice-presidents they never could have any difficulty in selecting the chairman for an evening. He could not allow the meeting to conclude without expressing his obligations to the council for the very handsome manner in which they had obeyed the President's call during the past year, and for the zeal and assiduity with which they had performed their duty towards the College at a great sacrifice of valuable time and personal comfort. [Hear, hear.] The members could really have no conception of the amount of labour of the past year which the council had been called upon to perform. There had been generally speaking council meetings once a week of late, in addition to special meetings in cases of emergency. Then there had

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been the lectures, at which the council had felt a sort of moral obligation to be present. There had been also the electrical meetings, and the meetings with respect to the Dental hospital which had been in contemplation. All these matters they had attended to, often at great inconvenience to themselves, and he thought that the members were bound in duty to give them a hearty vote of thanks for their arduous exertions during the year which had just terminated. [Cheers.] He begged to assure them that personally he felt deeply indebted to them. [Cheers.]

Mr Weiss said that at the first council meeting which he had attended he brought forward a proposition which appeared to be received with some degree of favour by his colleagues. It was not, he was sure, from any desire of self-glorification, or to show what he had done, that he agreed in the proposal which he then made, and which he was now about to repeat; but out of respect to the country and other members whose representatives the council were. He begged to move "that a statement be prepared and circulated amongst the members of the number of council and committee meetings that have been held during the year, and of the attendances of each member of the council at the council and committee meetings respectively." He thought that this would have a beneficial effect, as showing what they had done, and how many evenings they had devoted to the discharge of their important duties—duties which were certainly of a character that they never could be regarded as a pastime. [Hear.]

Mr Perkins seconded the motion, holding it to be only an act of justice to the members of the council that such a register should be made. He thought that the members should be made aware that they had taken some little amount of trouble in their service, and that although they had certainly enjoyed the honour of their position, they had received no recompense beyond that which most honest men were proud of, the consciousness of having done their duty. [Cheers.]

Mr Purland, in supporting the motion, differed from his friend the last speaker with respect to their having received no recompense for their labours, for he could honestly say that he had been amply compensated for what little he had done by having been brought into association with members of the profession with whom he should never have come in contact but for the College. [Cheers.] Friendships had been formed in the course of his connection with the College which he trusted never would be broken, and the value of which far more than compensated for any *désagrémens*, or for any aspersions which might have been cast upon him by those whose object it was to promote a rival institution. [Cheers.]

The Chairman thought that it would be rather invidious to publish the *names* of the council at each meeting, and suggested that the resolution should be so framed as to give the number of the council and committee meetings, and the number of attendances at each.

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Mr Weiss adopted this view, and the resolution, as amended, was carried unanimously.

Mr Runting said that he could not allow the meeting to separate without expressing his sincere regret that the President was about to retire from the chair. [Cheers.] The gratitude of the members should be unbounded to that gentleman for the manner in which he had presided over their meetings, and had conducted the affairs of the College throughout the time that he had been in office. It was at a critical juncture in their career that Mr Matthews accepted that post. At a time when their little bark was threatened with adverse winds, and was tossed upon the waves of discord and dissension until it was in imminent danger of being wrecked, he took the helm, and by his cool judgment, his indomitable perseverance, and his manly independence, he had enabled them to weather the storm, and had brought them safely into port. Under these circumstances he moved that they express their gratitude to Mr Matthews for the zeal, energy, and ability which he had displayed in their behalf, by passing to him a cordial and unanimous vote of thanks. [Cheers.]

Mr Humby seconded the motion.

Mr Rymer, before putting it to the meeting, said that he entirely agreed in all that had fallen from Mr Runting, having had an opportunity of witnessing the zeal and earnestness of purpose with which Mr Matthews had conducted the business of the College, not only in the office of President, but in that of Treasurer. The duties of these offices, and especially of the latter, entailed a great deal of trouble, and the clearness with which the accounts had been kept was really most admirable. The council had always been fully informed of the exact state of the finances, for their Treasurer had never allowed them for a moment to be in the dark as to the precise amount in hand, and had always exercised a most diligent care over the College purse. [Cheers.]

The motion was carried with acclamation.

The Chairman.—I am very glad, gentlemen, that in your opinion I have redeemed the pledge which I gave you when I took office, and I really feel that I have endeavoured, in some way, to fulfil the promise which I gave you that, whilst occupying this chair, I would be single-eyed—that I would look neither to the right hand nor to the left, but that I would pursue a straightforward course, keeping steadfastly in view the great objects for which we had been established. [Applause.] I took the helm, as Mr Runting has truly said, at a period of great difficulty. Our late coadjutors, with whom we had associated on terms of friendship, at whose table we had sat, and with whom we had eaten and drank, had left us, and I assure you that it was with pain and regret upon our part, that those associations were severed, and our intimate connection terminated. I wish that they had felt as strongly as I did when we were arranging the terms of amalgamation, and that they had expressed their views at the

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time with regard to that publication—the 'British Journal of Dental Science'—which was doing all in its power to prevent the amalgamaton being consummated. Mr Underwood stated publicly that he had said to Mr Tomes, who was the editor of the Journal, "If you continue to write in that scurrilous manner, it is impossible that we can amalgamate." [Hear, hear.] He felt it, and I felt it; yet, when next we met to consider and discuss the amalgamation, the Journal was more scurrilous than ever. It is evident, from what had occurred, that they never had a desire to amalgamate, but that they wished to obtain a foundation on which to raise themselves by disseminating jealousy and creating an opposition in our ranks. Their conduct reminds one of a fable of Æsop's. When the lion wanted to get into the herd of oxen and to make them his prey, they were so staunch and acted so much in concert, that he was unable by force to carry out his project; so he had recourse to artifice, and by whispering in their ears something detrimental of their fellows, he induced them to become jealous and suspicious of one another. They then began to occupy different pastures, and they so, one by one, soon became an easy prey to their wily antagonist. This is the course which has been pursued with regard to our College; there have been whisperings, and jealousies, and suspicions, and the result has been that many valued members have left us, that others have flagged in their exertions, and that we have, indeed, suffered very materially. [Hear, hear.] I mention this to show you that the position which I have occupied as your President, during these troublous times, has not been altogether a bed of roses; because I need not tell you that a person cannot be regularly and systematically attacked in a monthly periodical, as I have been, without feeling it in some way. [Hear, hear.] In fact, a man must be devoid of feeling if he did not. However, I was bound to bear these attacks, because I told you that I would serve you faithfully and fearlessly until the next election. I have done so, and that applause which you have given me, which is grateful to my heart, proves to me that I have done it to your satisfaction. [Cheers.] I retire, therefore, from this chair, with the proud consciousness that I have discharged my duty in a manner to meet with your approval, and that I have done nothing whilst I have been in this chair to derogate from the dignity of the office, or that can by possibility be detrimental to the interests of the College of which we are members. [Cheers.] I therefore beg warmly to thank you all, and to say, as I shall always say, that this College has been the means of bringing together many happy and congenial spirits; and until the day of my death I shall bear them all in kind remembrance. Until this institution was set on foot, no Dentist scarcely knew his neighbour—there had been so much jealousy and splitting up into parties amongst the profession. Our great ambition was to unite all in one common bond. I don't mean, of course, to say, that we should associate with those who degrade a liberal

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profession by villanous and vulgar advertisements, but our aim was to unite all the respectable members of the body, to infuse into them one spirit for the benefit of all, to communicate ideas, to disseminate information, and, in fact, to build up a temple, as it were, to the honour and glory of Dentists—to have an establishment of our own which should be a credit to the country and to ourselves. [Cheers.] But this can only be done by hearty, unselfish union and co-operation, for no great design like that which we contemplate can ever be carried to a successful issue whilst so many hold aloof from our proceedings. Those who wish to keep themselves quite select from every one else, may try to see what they can do, but I maintain that the very smallest portion of a building—if it be only half a brick—is of use to that building in the position which it occupies, because there can be no firm building without a unity of parts, and good cement to produce cohesion amongst those parts. Again thanking you for your kind expressions towards myself, I conclude by hoping that better times may be in store for us, and that brighter days may yet dawn upon our College. [Loud cheers.]

On the motion of Mr CHAPMAN, seconded by Mr SMALE, a vote of thanks was passed to Mr Rymer, Mr Hockley, and Mr Purland, the Honorary Secretaries, for the manner in which they had discharged the onerous duties of their respective offices.

These gentlemen briefly acknowledged the compliment, and the proceedings terminated.

STATEMENT OF THE NUMBER OF COUNCIL MEETINGS HELD AT THE COLLEGE OF DENTISTS OF ENGLAND, AND OF THE ATTENDANCE OF MEMBERS OF COUNCIL AT EACH MEETING, FROM MAY 21ST, 1858, TO JANUARY 25TH, 1859.

Council Meetings	29
Average attendance of Members at each Meeting of Council	12

January 30th, 1859. By Order, S. L. RYMER, A. HOCKLEY, } *Hon. Secs.*

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MONTHLY MEETING, FEBRUARY 1st.

The Fifth Ordinary Meeting of the Session was held on Tuesday, February 1st, Peter Matthews, Esq., in the chair.

The first part of the evening was devoted to the exhibition of subjects of interest in Dental Surgery and Mechanics. The Chairman exhibited a portion of necrosed lower jaw from a patient of his, arising from a fall from a step-ladder, by which the angle of the jaw came in contact with the edge of a couch; the necrosed portion ultimately came away, and a perfect cure was effected. He also placed before the members a fractured portion of a lower jaw, including the two bicuspids and the anterior molar tooth, caused by the improper use of the key instrument. This was a Dispensary patient, the alveolar process including the teeth exfoliated and the patient is now doing well.

Mr Humby exhibited an Articulating Bite Frame of novel construction, which by an ingenious arrangement can be adjusted to any position required. This apparatus, the invention of Mr Humby, was made by Mr Jack, surgical instrument maker.

A Bite Frame by Mr Stent was also shown, a description of which appeared in the Dental Review for February.

Several Dental Instruments, consisting of Forceps, Elevator, &c., were next exhibited. The forceps for the lower molar teeth were of an improved form, and admirably adapted to the purposes required. A Key Instrument, with improvements by Mr Harley, was also much admired.

The time allotted to these subjects having expired,

The Chairman stated that Mr Smith, of Chatham, had promised to read a paper this evening, explanatory of the models of Gun-shot Wounds, which he had presented to the Museum of this College; as well as some other cases of interest to the Dentist, but that gentleman had just written to him, the Chairman, stating his inability to be present this evening, and jotting down a few notes of cases, which he had requested the Chairman to read to this meeting. He therefore should take much pleasure in so doing, appealing to the members for any imperfection that might arise, as the *locum tenens* of Mr Smith.

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Mr Matthews then read the following paper, on

DENTAL MECHANICS.

Though part of the material which forms the subject of this paper has already appeared in print, I have been requested to make the models now on the table before you the subject of a short paper, as most of them are very different from those usually occurring in dental practice.

Take the model representing a case of osseous tumour of the upper jaw. This patient was eighty-four years of age, partially childish, and on parting with the last of her upper canine teeth, her family noticed that she appeared very uncomfortable, evinced great difficulty in swallowing her food, and sought the advice of their medical man. He examined the mouth, and discovered the tumour, which had in all probability been growing there twenty or thirty years, and had never caused her trouble or perplexity until the loss of her teeth brought the jaws into very close proximity to each other, and rendered it necessary to seek some professional assistance. Her medical attendant advised her friends to consult a Dentist upon the propriety of having mechanical assistance, which would keep the mouth in its proper condition; and on applying to me, I succeeded in taking models, which was by no means so easy as might be supposed, and at the rather mature age of eighty-four the lady began the use of artificial teeth, by wearing nearly a whole set. She lived several years subsequently, and experienced no further difficulty upon the subject, which brought her to make her dentistry acquaintance.

The model representing a duplex right upper central is rather singular. I took it from the mouth of a patient of sixteen. It will be perceived that it is not osseous union of central and lateral, such as does sometimes occur, as the lateral is present as a distinct tooth. The canine does not appear in the model; however, it was then visible, though rather high in the gum.

The two models, upper and under, representing a case of incomplete second dentition, will, I dare say, be considered interesting, for though there are, of course, many similar recorded cases, they occur but seldom. I first saw it about five years ago. She then came to be relieved of some stumps, she said, that caused her some little irritation. They were mere spiculæ of bone, not easily recognisable as being connected with teeth, but were doubtless partially absorbed fangs of temporary teeth. There were but two or three of them. She positively affirmed she had had no teeth extracted for many years; had lost most of the first set early, and only had them partially replaced by the second set. She was a tall, well-formed woman, spare, but healthy. The width of the lower jaw is somewhat remarkable. Certainly it was not from deficient room that the permanent teeth were undeveloped. Her age, I should have stated, was about twenty-eight when I first saw her.

The model (upper, with the very large aperture on the right side) represents a case in which extraction had been performed with very much more zeal than discretion. In an attempt to extract a bi-cuspid the maxilla was fractured, and doubtless the floor of the antrum injured. I did not see the case until the parts were healed, nor in fact did I know anything about it, though it occurred in my own immediate neighbourhood, until he was sent to me for consultation by his surgeon. Though it will interest you to see the model, I do not think that I need take up your time by any further details respecting it. The method

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that I chose for replacing the parts was metal plate, with clasps lined and padded with gutta percha. In allusion to the latter article, I may as well state that I have found it of immense service in treating these and similar cases. When properly prepared it wears very well, and admits of readiness of adaptation, alteration, or renewal; of the utmost importance to the Dentist when treating newly-healed surfaces.

The gun-shot wounds illustrated by the models on the table have already been presented to your notice through the pages of the 'Quarterly Journal of Dental Science.' There are, however, two cases there to which you are strangers; they will, I hope, be recognised by description.

One upper gun-shot wound, carrying away incisors, bi-cuspids, and one molar.

One lower gun-shot wound from a nine-pound shot, entirely carrying away the left section of the jaw, and of course causing frightful mutilation and contraction of the muscles on that side of the face. The model illustrating its restoration is likewise before you, but the very limited time that I have at my disposal prevents my pursuing the subject further, and compels me to submit to the perplexed eyes of your president a very hastily and ill-written manuscript, one which, if it affords you any satisfaction, will necessitate the bestowal of far more thanks to him for having read it, than to myself for having written it.

JOHN COX SMITH, Dentist to the Dispensary, Chatham.

The models of the above and other interesting cases were then examined, and the discussion on their merits having terminated,

The Chairman, in proposing a vote of thanks to Mr Smith, said:

"Gentlemen,—The models that have been laid before you this evening, the work of Mr Smith, are extremely interesting, showing that the elements of war are exceedingly destructive; yet, notwithstanding shattered bones and muscles torn asunder, the human frame is enabled by Divine Providence to bear the shock, and immediately the reparative process sets in, and wonderful cures are performed without our aid. In one instance, however, you perceive a remarkable improvement, by mechanical assistance, where Mr Smith, before permanent union of two fractured surfaces had taken place, expanded the parts, and so had been enabled to increase, not only the surface, but the rotundity of the jaw, and had supplied the space with artificial teeth. We are greatly indebted to Mr Smith for his unique and valuable gift to the museum, as well as for the stimulus he has given to Dentists, when we despair of benefiting a fellow creature ultimately, though the work of destruction be great, and impossibilities apparently, appear in the distance."

A unanimous vote of thanks was duly accorded to Mr Smith, in the terms expressed by their Chairman.

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MONTHLY MEETING, TUESDAY, MARCH 1st.

PETER MATTHEWS, ESQ., IN THE CHAIR.

Dr Purland read the following Paper on

DENTAL AND OTHER OPERATIONS IN THE MESMERIC TRANCE.

The term Mesmerism is derived from the resuscitator of the science, Antony Mesmer, a Doctor of Medicine of the University of Vienna. He was born in Swabia, the 23rd of May, 1738, and obtained his degree in 1766.

On or about 1770 he propounded his views on the science of Animal Magnetism.

The Faculty of that day, like the Faculty of the present, were slow to believe, and too indolent to test in their own persons, that which Mesmer affected to believe was a discovery of his own.

Not only did he find his professional brethren unfavourable to his views, but he found them determined to oppose the introduction of Mesmerism as a curative agent, in every possible way, without regard to truth or honesty.

In vain did Mesmer *cure* diseases considered *incurable* by the University and the heads of Hospitals, and challenge them to an inquiry —the Faculty had made up their minds that Animal Magnetism was against the laws of nature and their own pre-conceived ideas; and Mesmer, disgusted with the prejudice that opposed him, left Vienna for Paris in 1776.

So rapid was his success in the cure of diseases that had defied the power of medicine, that in two years he received no less a sum than 400,000 francs (16,000*l.*), and his pupil, Dr D'Eslon, it is said, made a fortune of 100,000*l.*

But it must not be supposed that he met with no opposition. Oh, no! The Medicals, true to the policy pursued in the case of the great Hervey, opposed the introduction of Animal Magnetism with all their might, but in vain; however, the French revolution did what they so much desired, put an end for a time to the dreaded innovation.

That Mesmer was a charlatan there cannot be much doubt, he operated upon his patients in a cabalistic dress, affected a peculiar air of mystery, and arrogated to himself the *discovery* of a means of alleviating the miseries of his fellow-creatures. But he was too well read and too acute not to be aware that Magnetism was practised ages be-

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fore his time. If we look to Egypt we find it practised by her physicians; the whole process is depicted on the walls of the tombs. Turn we to India, we have the same manipulation, under the name of the *Jar-phoonk*, in constant use, and from the remotest antiquity. In our own country, in the reign of Charles the Second, we find an Irish gentleman, named Valentine Greatrakes, performing very extraordinary cures, which created such astonishment, that the Hon. Mr Boyle—no mean authority—wrote a book containing his entire belief in their genuineness.

Reverting to India, but somewhat wrong in date, I venture to refer to a celebrated physician and my lamented friend, Dr Esdaile, whose name ought to go down to posterity as a benefactor to the human race. This great man performed in Calcutta some of the most formidable operations that ever fell to the lot of a medical man. *Scrotal Tumours of all sizes, from* 10 *pounds to* 103 *pounds weight!* prolapsus ani, the size of a child's head, reduced; strangulated hernia reduced; contracted arms and knees straightened; great toe-nails cut out by the roots; cataracts operated on; and cancers extirpated. And all done whilst the patients were unconscious by being mesmerised. "In each and all there was *an entire absence of every—even the slightest—indication* of physical suffering."

In 1837 a physician of European fame had his attention drawn, as he says, "to a subject which, though utterly neglected in this country, was receiving great attention on the continent.

"Certain wonderful phenomena, and certain modes of producing these phenomena, and of curing diseases ill understood and difficult to cure, were vouched for by men of judgment. I soon found, said the learned doctor, that there was a fund of truth in what I had heard and read—that an agent or agency existed which had been overlooked; and my inquiries were soon attended with such results, that a large number of Medical men, distinguished Noblemen, nay, Royalty itself, Members of the House of Commons, some of the first men in the country, Professors of Oxford, Cambridge, King's College, and Edinburgh, the President of the Royal and Linnean Societies, and Teachers of the various Hospitals, flocked to witness my facts. Some of these gentlemen made handsome donations to the hospital.

"This soon excited envy, and this excited a commotion, and the late Dean invited me to desist. He urged that, whether the wonderful facts were true or not, and whether great benefit in the treatment of diseases would result or not, we ought to consider the interests of the school. . .

"I replied, that the institution was established for the dissemination and discovery of truth; that all other considerations were secondary to this."

Most Medical men know the issue of the contest, the great man I have just quoted is Dr Elliotson; and the building in which it took place was the London University Hospital.

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The Council, with barbaric ignorance, refused to allow the Doctor to do what he had an undoubted right to do, and the result was Dr Elliotson's resignation. This took place in 1839.

Since that time Dr Elliotson has lost a princely fortune by his adherence, and—I say most emphatically—*conscientious* adherence to this great fact.

Up to 1843, I was myself a sceptic as to the power of Animal Magnetism. I was induced to witness a case at which I was much surprised, but not convinced. I determined to try experiments quietly and philosophically. I did so, and soon satisfied myself that Mesmerism was a great fact, and I do not hesitate in declaring my conviction that any one may in like manner satisfy himself of its truth by experimenting in his own family circle.

There are a few who wisely say " they never saw a person mesmerised, that they never would see one, and that if they did see it, they would not believe it ! " Such people are scarce, and it is advisable to let them carry their ignorance to the grave.

In 1846 the Mesmeric Infirmary was projected at the house of the late Earl of Ducie, and is now a well-established institution in Weymouth street, Portland place. There diseases that have for years bid defiance to medical skill, that have run the gauntlet of most of our hospitals, and been declared *incurable* by the most eminent surgeons and physicians, *have been cured in an incredible short space of time*—no medicines given, no blisters applied—nothing used, but that most potent of medicines, Mesmerism!

Hundreds, nay, thousands of cases are recorded in the *thirteen volumes* of 'The Zoist,' published under the superintendence and editorship of Dr Elliotson, some cured at the Infirmary, and others by clergymen, noblemen, and others.

That some notion may be formed of the power of Animal Magnetism, I will enumerate a few of the cases that have been, or are being, cured or mitigated under its influence: Chorea, or St Vitus's dance; Epilepsy; Dropsy; Hemiphlegia; Paraphlegia; Scrofula; Scald-head, Blindness; Sciatica; Deafness; the Dumb made to speak, and a host of other complaints.

It may be very fairly asked, If Mesmerism can produce immunity from pain, and cure diseases, why is it not more in use? The answer is easily given. Medical men, with some few honourable exceptions, ignore its power altogether; not because they know anything about it, quite the contrary; they consider it beneath *their* notice, and because they *will not* examine it, remain in ignorance of a power which, used

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as an adjunct to medicine, would elevate it into a science to be depended upon, and remove that stigma of uncertainty which clings so closely to Medical treatment.

But there is one great consolation; all this ignoring by Medical men and Medical Journals; all the vituperation so bountifully showered upon the head of the Mesmerist, cannot alter the fact that extraordinary cures are effected every day by Mesmerism *alone*, and we have only to glance at the present state of Mesmerism to be very hopeful for the future. It has during the last two years assumed an importance and obtained a sanction that was little expected by those "mad enthusiasts," who have watched its progress during the last eight years; and those who bore the brunt of the "scoffer and malignant" twelve or fifteen years ago, scarcely ventured to hope that Mesmerism would be sought after, or become so powerful a curative as it has proved itself to be. The loud brawling opponent has sunk into the waverer; and the quiet sceptic has become a believer in, and a practiser of, that he would have shunned a few years since.

The important step towards this state of things was the publication of 'THE ZOIST,' and the founding of THE MESMERIC INFIRMARY.

I will now enumerate some of the operations that have been performed in the mesmeric trance, and then proceed to what more immediately concerns ourselves as Dentists.

The first operation in England was the introduction of a seaton into the back of a patient, under the direction of Dr Elliotson, in the spring of 1838.

Then we have had divisions of the tendons of the knee-joint; and subsequently amputations of legs, arms, fingers; removal of tonsil. tumours, cancers from breast, opening of large abscesses, besides hundreds of inferior operations.

One, of which I was an eye-witness, will suffice to show the superiority of Mesmerism as an anæsthetic:

ASTOUNDING OPERATION IN THE MESMERIC TRANCE.

"Truth is stranger than fiction."

At the invitation of Dr Elliotson I attended at the Mesmeric Infirmary in Weymouth street, Portland place, on Wednesday, April 26, 1854, to witness the removal of the right breast of a female whilst in the mesmeric trance.

I entered the institution at a quarter-past one, in company with Mr Kiste, and we were shortly joined by Dr Elliotson, Mr Tubbs the operator, Colonel Bagnold, Dr Symes, Mr Goff, and Mr Amor.

At two several other gentlemen arrived, and much anxiety was expressed as to the result of the operation. Mr Tubbs was, however, quite confident that his patient would not feel it in the least.

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Shortly after two o'clock we were ushered up stairs; here we found the patient,—a female of apparently about forty years of age, seated in a reclining chair, and Mr Tubbs, with Mr Burman as his assistant, prepared to perform the operation.

The company being seated, Mr Tubbs proceeded to entrance his patient: this he effected in a few minutes by standing upon a chair *behind* her, taking her hands in his, and looking down steadily into her eyes, which were raised for the purpose.

After the quivering and closing the eyelids, Mr T. descended, and made passes in front, from the head to the knees, for about two minutes: she was then considered so deeply entranced as to be able to undergo *any operation, however severe, without feeling it.* The result fully justified this confidence.

After the breast had been examined by Dr Elliotson and Dr Symes, the knife was handed to Mr Tubbs by Mr Burman, and the deepest anxiety was depicted on every face.

The first incision was made amidst the most breathless silence, and all eyes were directed to the face of the patient: *not a muscle moved—not a sigh—there was the same placid smile as when she closed her eyes under the mesmeric influence; she breathed freely: her left hand lay listlessly in her lap*—the right was held up by Mr Burman, to be out of the way—*there was no restraint.*

Mr Tubbs continued to dissect out the breast leisurely—*there was no hurry to get it over*; and when the whole was removed, the silent astonishment of the gentlemen assembled was excessive.

But Mr Tubbs had not done yet: he probed with his finger every part, and finding a portion that had eluded his knife, *seized it, and cut it out as coolly as if trying his weapon upon a dead body.*

Dr Symes and Mr Beard, at Mr Tubbs's request, examined the patient, and on their declaration that all had been removed, the operator, assisted by Mr Burman, passed five needles through the lips of the wound and inserted the sutures.

Still the patient slept—still smiled. A little wine and water was administered—her dress was arranged—each gentleman resumed his seat—and Mr Tubbs awakened his patient by a few transverse passes.

On opening her eyes, she was addressed by

Mr Tubbs.—"How do you feel?"

Patient.—"Have you done it?"

Mr Tubbs.—"Supposing it is done, how do you feel?"

Patient.—"I am very well."

Mr Tubbs.—"Have you felt anything?"

Patient.—"No! I have felt nothing."

Mr Tubbs.—"Then it *is done.*"

The patient smiling incredulously, her dress was opened, and upon her being satisfied that it *was done*, her face beamed with thankfulness.

To all questions put she answered *decidedly that she had not, nor did she feel, the slightest pain; on the contrary, she was quite unconscious that the operation had been performed until awakened.*

After a short address by Mr Tubbs relative to the operation, preparations were made for *carrying* the patient to bed; but she declined all assistance, and *walked up two flights of stairs as if nothing had occurred.*

Mr Tubbs was now warmly congratulated upon his success by his brother mesmerists and their friends, the accompanying certificate was drawn up and signed, and a general wish expressed, that those *self-styled medical magnates* (*?*) who scoff at "*the greatest truth in nature,*"

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for want of a little *common sense to leaven their learning*, would have the *charity* to follow the noble example set by Mr Tubbs, *and save their patients from the tortures now so needlessly inflicted by them.*

Thus ended one of the most remarkable meetings ever convened, and proud must every member feel at the opportunity afforded him of witnessing one of the most satisfactory operations ever performed in England.

T. PURLAND,
Surgeon-Dentist.

7 Mortimer street, Cavendish square,
May 1, 1854.

Mesmeric Institute, 36 Weymouth street,
Portland place, April 26, 1854.

We, the undersigned members and visitors of the Mesmeric Infirmary, witnessed the amputation of the right breast of Mrs Flowerday, by Mr W. J. Tubbs, Surgeon. of Upwell, Cambridgeshire, she being in the mesmeric trance induced by the operator. And we unhesitatingly assert and believe that the patient did not suffer the slightest pain, and upon being awakened, declined every assistance, and *walked* up stairs to bed.

John Elliotson, M D., F.R.S., Conduit street.
Edmund S. Symes, M.D., Bowden House, Berkeley square.
Adolphe Kiste, 37 Maddox street.
R. Goff, 21 Kensington Gore.
J. Amor, 135 New Bond street.
Smith Burman, Surgeon, Wisbeach.
F. C. Beard, Surgeon, 44 Welbeck street.
M. E. Bagnold, 14 Upper Hamilton terrace, St John's wood.
T. A Shaw, Kensington.
W. Underwood, 1 Vere street, Cavendish square.
G. F. Lusignan, 2 Little Bush lane.
C. Mayhew, 33 Alfred street.
T. Purland, Surgeon-Dentist, 7 Mortimer street.
W. Fisher. 18 Euston place, Euston square.
Elizabeth Sherborne, Matron.
T. Gardiner, Resident Secretary.

Of the thousands of cures the two following will be sufficient to excite the *risibility* of the sceptic:

CURE OF ABDOMINAL DROPSY.

Mrs Grainger, of Teatotal row, Yearsley, near Uxbridge, admitted a patient at the Mesmeric Infirmary, November, 1854.

This patient had experienced an increasing sense of fulness about the chest and body during six years; and being told that water was accumulating she consulted a surgeon at Uxbridge, who at once gave her medicine, and continued the supply for six months, when he advised her removal to the University Hospital in London.

Here she received large quantities of physic without benefit, and the water increasing rapidly, she was tapped.

After the operation it was discovered she had ovarian tumour, and she was told to prepare at once for an operation. To this she objected, and, after remaining six months in hospital and being tapped three times, was discharged *incurable*.

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She then applied to Dr Coffin, and took medicine for six months more; was tapped three times under that gentleman's directions, and again discharged as *incurable*.

After so much medicine and suffering it is not surprising that the patient should *begin* to fancy she was indeed on the "incurable list;" and, abandoning all hope, returned home.

The neighbours in the village were next laid under contribution for "old receipts" for the "certain cure" of dropsy; many of which were tried in the vain hope of alleviating her pains, which were at times almost unbearable.

Her sister, who lives in London, states, that when going to visit her she heard her cries long before she reached the house; and on the last, previous to her being mesmerised, she was told by her doctor that a coffin would be in the house when she came again, and she herself hoped that death would relieve the sufferer.

The sister having heard of the astonishing cures produced by Mesmerism upon patients deemed by the best medical authorities *incurable*, determined, if possible, to have it tried upon Mrs Grainger, in the forlorn hope of its affording her some relief.

Mr Fisher, a Mesmerist attached to the Mesmeric Infirmary, was consulted, and with a liberality that does him honour offered to give his time and assistance, twice a week, if his carriage by rail was paid to Uxbridge. He mesmerised her from February 19 to the beginning of November, 1854, when the improvement was so great, and the case so singular, that on its being mentioned to the Council of the Mesmeric Infirmary, the Secretary was despatched to Uxbridge to report officially upon the case. The inquiry being satisfactory, the Council resolved to place her with her sister in town, to pay for her board and lodging, and to have her mesmerised every day.

On the 3rd of January, 1855, Mrs Grainger was examined by Dr Elliotson before the Council, and pronounced *cured*.

Her gratitude was great, and her cheerfulness marked, when she returned thanks for her remarkable and unexpected cure.

This patient had been tapped fifty-five times! and after the fifty-second tapping she measured above five feet in circumference. On the fifty-third tapping, the enormous quantity of *twelve gallons* was drawn off—six pails! on the fifty-fourth and fifth, eleven gallons! The fifty-five operations averaging nine gallons: in all, *four hundred and ninety-five gallons*.

As soon as Mesmerism was applied—in the midst of sneers and hisses from those familiar with the case—she gradually improved in health and decreased in size, until she was cured.

RIGHT HEMIPLEGIA.

James Churchill, aged 33, Barnes Elms, Putney, applied for admission in August, 1857; but the distance being too great for him to attend, he was advised to get a friend to mesmerise him, and instruction was accordingly given by Mr Fradelle to Mr T. Wetherall, Inspector of the Electric Telegraph, Tooting, Surrey, who at once kindly undertook the case. He was unable to walk without the assistance of two sticks, dragged his right leg, and was unable to bend it, and his right arm was very weak, so that he was unable to work. He had been at St George's Hospital, and also under the medical care of Mr Whiteman, the parish surgeon of Putney, who at last said "there was no cure for him." On the 18th of September Mr Wetherall called at the Infirmary, and in-

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formed the Secretary that James Churchill was perfectly cured; could walk without even one stick,—take a long walk which he enjoyed, and had nearly recovered his former strength. He was requested to appear before the Council, and did so September 30, when the late Gen. Bagnold expressed himself highly gratified at the restoration. The parish doctor, to whom he had shown himself, denied that Mesmerism had cured him. "*But here I am cured,*" replied Churchill: "*all the medicine I have taken has done me no good. You said there was no cure for me. I have been mesmerised, not taken medicine during the time, and here I stand cured.*" "*Well, well,*" answered the facetious doctor, "*if I were to mesmerise any one and cure him by it, I should be drummed out of the profession.*" The patient has ever since been able to work, and is the "wonder" of the place.

And now, gentlemen, I come to what immediately concerns ourselves as Surgeon-Dentists, the extraction of teeth in the Mesmeric trance.

The list I offer is far from complete. It contains the names of operators well known to most of you, and are more or less respected.

In 1841—	Mr Nicholles, of Bruton street, extracted	5 teeth.
„	Mr Martin, Portsmouth - -	2 „
In 1842—	Mr Prideaux, Southampton - -	25 „
„	Mr Carstairs, Sheffield - -	2 „
In 1843—	Mr Grattan, Newry - - -	2 „
„	Mr Nasmyth, Edinburgh - -	1 „
„	Dr Tuthill, Jamaica - - -	2 „
In 1844—	Mr Webb, Bungay - - -	3 „
„	Mr Tomes, Middlesex Hospital	10 „
„	Mr Heath, Edgware road - -	2 „
„	Mr Weekes, Barnstaple - -	4 „
„	Mr Shew, Cheltenham - -	1 „
„	Mr Lintot, Welbeck street - -	1 „
In 1845-6—	Professor Bell, King's College - -	8 „
„	Mr Thompson, York - - -	3 „
„	Mr Edwards, Bath - - -	2 „

My own dental operations amount to 176. I have extracted ten teeth and two stumps for one patient, three and four for others, and in no instance have they experienced the slightest pain.

In conclusion, allow me to observe, that, believing as I do to the fullest extent in this wonderful power as a curative agent, and an alleviation of human suffering, I hold it indispensable that it form part of a medical education; and so strongly do I feel upon this point, that I declare every medical man unqualified to obtain the confidence of his patients if he wilfully neglect to examine, or continue to ignore it.

Not all the books of cures *attributed to medicine* that ever were pub-

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lished, can for an instant stand comparison with the cures detailed in the thirteen volumes of 'THE ZOIST,' the reports of the Mesmeric Infirmaries, and the statements published by private individuals.

I had hoped to have been able to show you an operation, but I find that the patient I have been able to procure has no teeth to spare, but he has been operated upon by me. I must, therefore, be content with showing you the *modus operandi*, and, I hope, some of the phenomena of Mesmerism.

Dr Purland, after having concluded his paper, called Henry Stanley, aged sixty-two years, who stated that he had been afflicted with chalky gout, with knees and toes swollen to such a degree as to prevent him from working or walking; had been in the hospital and under medical treatment twenty-two weeks, and considered that he came out worse than he went in. He had, nevertheless, been enabled to walk with a crutch and stick, after eleven weeks' treatment in the hospital. He was now much better, and attributed his improvement to mesmeric treatment.

A member inquired if he had taken any medicine under such treatment. He replied nothing but a little mesmerised water.

Mr W. Fisher was then introduced, who was stated to be a very powerful mesmeriser, and at the same time very susceptible to the mesmeric influence. Having taken a seat, Dr Purland at once commenced the necessary manipulation to induce the mesmeric trance, and in the course of a few minutes Mr Fisher appeared to be totally insensible, and quite under the influence of the operator. The muscles of the arms and legs were brought to a state of great rigidity, and appeared to be entirely under the influence of the operator, as flaccidity or rigidity were produced almost instantaneously; many gentlemen examined the patient while in this state, and appeared to be satisfied as to the effect produced.

Mr W. Perkins asked Dr Purland in what way mesmerism affected disease so as to induce a cure.

Dr Purland replied, that if Mr Perkins could say why the magnetic needle pointed to the north, he (Dr Purland) could answer the question; he could not, however, state any reason *why* a cure was effected by mesmerism, but could only state the simple fact that *such* was the case. He had induced mesmerism in a lady who was separated from him by being in another apartment at the time, the only connection between the lady and himself being a string which both held by. He also related a case of mesmerism being induced in a lady who was supplied

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with mesmerised gloves, the gloves having been sent from London to a considerable distance in the country, and still retaining the remarkable mesmeric quality.

Dr Blandy (of Baltimore, U.S.) would like to know about what per-centage of persons were liable to the mesmeric influence?

Dr Purland replied that an effect could be produced upon any person, but not so as to induce sleep.

Dr Blandy would like to know what the principle consisted in?

Dr Purland said it was supposed to be electricity, but nothing was clearly known as to its cause.

Dr Blandy said that strange effects were sometimes produced, but he thought them very uncertain in medical cases.

Dr Purland having entered into some further explanations, Henry Stanley was again introduced, and questioned by some gentlemen who had entered the room late.

Mr Betts mentioned a case where he performed the operation of cupping upon a young lady while in a state of mesmerism, who declared that no pain whatever had been felt. He was introduced to the patient by Dr Elliotson.

Dr Purland said he had known cases of parturition take place perfectly painless.

Mr Ballard was surprised that the parts should be rigid during parturition.

Dr Purland explained that such was not the case; rigidity or laxity could be produced at will by the operator.

Mr Weiss remarked that rigidity of the muscles of the jaw was frequently produced by chloroform.

Mr Matthews thought it would not have affected the involuntary muscles.

Mr Turner wished to know if frequent operations produced any bad effect on the operator or the patient.

Dr Purland said, none whatever. Local mesmerism was generally used, so that the diseased part was the only part affected. An operator might, however, be injured by too long a perseverance in one kind of operation.

Mr Matthews thought that the gentlemen who had entered late (among whom were Dr Blandy, Mr Harry Lobb, and a few others) would probably like to see Mr Fisher in the mesmeric state, if Mr Fisher and Dr Purland did not object to it: they being both willing, the mesmeric state was reproduced, and the patient was examined by

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the several gentlemen who had not before had an opportunity of so doing. After he had been restored to consciousness,

Mr Turner expressed himself as being fully convinced that there was something real in the mesmeric trance, as he had seen effects produced in a fellow pupil of his, and who could not be relieved from them for some considerable time, when it was desirable that the effects should have been immediately got rid of; as it was, the master of the two had discovered that they had been playing at mesmerising with each other, instead of minding their business; but as to its curative effects he had doubts; there appeared to be no theory on which its power of healing could be accounted for. People used Holloway's ointment, and got well sometimes during its use, but he did not think that the ointment produced the cure, and the same thing might be said with regard to mesmerism. He thought weak-minded and superstitious persons were more easily influenced by it than others. He had known cases produced against the will, in India, after frequent operations. Again, if mesmerism was intended as a curative, the great majority of persons would be influenced by it; but such was not the case, it was only in isolated cases where the influence was felt.

Dr Purland said that he had seen children of all ages mesmerised.

Mr Davies, from Yorkshire, stated that he knew a case of atrophy in a woman, of thirty years' duration, who had been restored to health by mesmerism; and also related a case of a young female who was mesmerised against her will.

On the motion of the chairman, a vote of thanks was unanimously passed to Dr Purland for his paper, after which the meeting adjourned.

SPECIAL GENERAL MEETING.

A SPECIAL General Meeting of the Members of the College was held on the 16th March, at the rooms of the Institution, Cavendish square, in pursuance of the following requisition.

February 22nd, 1859.

TO THE COUNCIL OF THE COLLEGE OF DENTISTS OF ENGLAND.

We, the undersigned Members of the College of Dentists of England, being of opinion that the original principles on which the College was founded (in the late unfortunate attempts at

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amalgamation, and the differences arising in consequence) have been departed from, greatly to the disadvantage of the College, beg that the Council will convene an early Meeting of the Members, for the purpose of taking into consideration the present position of the College, and to determine what course shall be pursued with regard to its future management.

R. THOMSON.	H. T. KEMPTON.
W. CHAPMAN.	THOS. C. VIDLER.
G. J. WATT.	WILLIAM RUNTING.
A. DUBOIS.	JOHN HUMBY.
CHAS. STODDART.	A. HOCKLEY.

The attendance was very numerous, and the Meeting was presided over by Peter Matthews, Esq.

The Chairman, in opening the business, said that his remarks should be very brief, for no doubt they had all received a Circular from the Secretary, convening the Meeting. They would remember that at their last Annual Meeting he suggested that they should call a Special Assembly in order to take into consideration the present position of the College; and he had no doubt that it was in consequence of the observations which he then made that the present meeting had been summoned.

Mr Rymer (Hon. Sec. to the Council) then read the Circular convening the Meeting.

Mr THOMSON rose and said: Mr President and Gentlemen,—Some of the members having thought it advisable that a meeting should take place, to take into consideration the present position of this College, and to deliberate upon what course it may be thought best to pursue for future action, and as my name heads the list of those members who have signed the requisition for this meeting, I may be expected to bring forward some plan, or make some propositions under existing circumstances; but I have been so much engaged otherwise, that I really have not had time to devote to it; this I regret, because of the great importance attached. My reason for first joining this movement was not to support the actual promoters, but the principle, as I conscientiously believed that something was necessary to be done, if the British Dentist is to maintain his position with other nations. There are no people in Europe, or perhaps the world, like the noble and wealthy classes of England, for extending their patronage to foreign in preference to native talent, when there are circumstances that lead them to believe that such is the most efficient, and this is too often supposed to be the case when there is no reality. This results from prejudice, and prejudice is a subtile agent not easily subdued or overcome. In early life I was situated so as to be cognizant of the bad effects of prejudice in favour of foreign talent and against native, however mean the former, and superior the latter. This was in a very beautiful line of art, that no

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man could follow unless he was possessed of genius, and great abilities generally; there were hundreds of very superior men employed in it, many of their names were not only household words, but they were worshipped by those who required their services; but the Government of a sister foreign nation established an institution for the systematic education of this line of art. As soon as this became known in England a cry arose, which soon became universal, that that nation having this institution, how greatly the men of that country must excel, and it had the effect, in the course of a few years, of bringing many of the most eminent professors of the art from affluence to penury. Those advanced in years and most experienced went to the wall, while the younger men turned their attention to other pursuits. There has since been a reaction in favour of native talent in that line; but it was not brought round till our Government established similar institutions. The present position of the Dental Profession appears to be much analogous. Since the establishment of a Foreign College for Dentists I have observed a strong tide setting in from across the Atlantic, that will overwhelm many, unless there is something done by union to raise a breakwater to stem the swelling torrent and keep it within bounds, and the gentlemen who are likely to be affected as any are they who have been fostering this devastating element. The prevailing principle with the English Dentist has been, since the establishment of the Baltimore College, to praise and exalt the foreign Dentist, and to condemn or deprecate their fellow-practitioners at home, forgetful that they themselves, in their turn, may be lessened, along with the whole body, in the eyes of the British public, to whom it is now so well known that the Americans have a College, and of which it is believed that every American Dentist is a member. But this appears to be far from being the case. But they have the name of having a College, and that is enough, and that is wherein lies the grand secret of their success. For having established a College and other Dental Institutions, they are to be commended, and all they say in their own praise, or of each other, is perfectly justifiable. Yet, when any attempt is made to emulate them, the majority hold aloof, and others use all the means in their power to crush the efforts that are being made. This College must be supported by all who study their future advantage. Notwithstanding all the opposition, there are still good funds, an interesting museum, and a respectable number of members. A school of Dental Science is about to be established, but is it probable that Dentists who have been in practice perhaps for twenty years will join it as students? I say no. Then let this College be supported for those who have long been in practice, and have conducted their professional duties efficiently and creditably to themselves, and satisfactorily to those who have patronised them; and let the school be for young men who are about to enter the

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Profession. It is expected that the College of Surgeons will grant Dental diplomas to those who study at that school; should this be the case, they will soon come in opposition to those now in practice, and all that the older practitioners can have will only be, perhaps, hospital certificates, which, if the possessor thinks it advisable to have framed and hung up in his surgery, would have but a poor look in comparison to this intended Dental diploma from the College of Surgeons. And that is not all, there is the foreigner, with his name, which has been sounded before his arrival for perhaps the last fifteen years, come, backed by a diploma as a doctor of Dental Surgery; and again, a few Englishmen, who, leaving home for a short period, return, boasting of the same qualification, a D.D.S.; such qualification, if genuine, seems to be easily obtained in America, for we hear of those who have their diploma giving a London Dentist a fee for tuition after their return. This position is very humiliating to the English Dentist; why should it be so much of a boast to have visited America, it is only because they have a college. Then I say we ought to have a college, there is as much talent, genius, and perseverance in England as anywhere else. (Hear, hear.) Then why lag behind any other nation? The body of English Dentists are equal to any that can be brought against them, if prejudice is set aside. Some of the American Dentists certainly excel in gold stopping, for which they deserve great credit. But then they are not all first-class stoppers, any more than that English Dentists are not all good practical men. If we are to maintain our position, we must support this College, and keep up its character by having first-class lectures, such as are given by Dr Richardson, and eventually we will command respect. Our cause is a good and just one, and if united, it shall ultimately prevail, and finally triumph. (Applause.)

I regret that the many claims upon my time have prevented my submitting to the Meeting such a series of well digested measures as the emergency of our present position would seem to demand; but I hope that my omission in this respect will be supplied by some of my co-requisitionists. (Hear, hear.)

Mr Weiss, who had been requested by the requisitionists to embody their views in a resolution, rose to move:

That this Meeting, being now in possession of all the facts relating to the present position of the College, and feeling that the College, by departing from its original objects and intentions, has been deprived of much of its usefulness to the Dental body at large; resolves that the regulations passed September 22nd, 1858, be now rescinded, and that the Council be empowered to frame such bye-laws as shall carry out the principles on which the College was founded, and to submit the same to a future meeting of Members. Further—that such bye-laws shall include provisions for granting Diplomas of Membership, without examination, to those Members of the Profession now in

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practice; to institute an examination for those who have not commenced practice, but who may hereafter desire Membership; to open a Reading Room and Library for the use of Members, and to appoint Lectureships on subjects relating to Dental Science.

He thought it necessary, in reviewing the present aspect of affairs, that they should go back to that period when the present Council entered upon office. The difficulties of their position at that time had been so often discussed that it was unnecessary to dwell upon them now. There was every desire to continue the College upon its original foundation, but it was thought important that an effort should be made to unite all parties, and with that view, and with the hope of raising the Dental Profession generally, the regulations were agreed to, which were confirmed on the 22nd of September last. It was needless to remark what no doubt they had most of them discovered, that it would be impossible to carry out those regulations. They had discussed the matter so frequently that they had long since determined that if they were to continue as a College, and there was no reason why they should not, they must do so as an independent body. It would be perfectly competent for them, after the ratification of the resolution which he had read, to guard against any person who might hereafter wish to become a Member of the College practising who did not hold a diploma from a licensing body. That was a matter, the details of which might be settled hereafter; but that it should be imperative upon Dentists to hold the diploma of any other licensing body than their own appeared to him to be simply preposterous. (Cheers). He contended that it was unnecessary that they should ever allow any blanks to occur in the officers of their College; although he admitted that they had suffered severely of late, not so much by opposition from without as by desertion from within, and he could not but feel surprised that men who professed to have a common object with them should have left them at the most critical period of their career. (Hear, hear.) There was no doubt that they had suffered severely from the desertion of those who had no excuse to offer for their withdrawal, and who could neither say that they disapproved of the object of the College, or of the means by which those objects were sought to be maintained. He urged, therefore, that it was of prime importance that they should fill up all the offices of the College, even although in the first instance it might be at some little inconvenience to themselves. He would only further add that in their future proceedings they had now arrived at a position when mere externals must not be considered at the expense of more solid advantages, and when the most stringent economy must be practised in the management of their funds, and the general direction of their affairs. (Hear, hear.)

Mr Perkins begged most cordially to second the resolution,

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because it embodied the views which he had held from the time of the first meeting that had led to the origination of the College of Dentists. It had long been regarded as a desideratum that the Dentists of this country should be more intimately acquainted with each other, that they should have a rallying point round which they could meet and discuss matters of common interest to them all, and that they should have a something to which they could refer as a proof of their ability to practise their Profession. With these views they succeeded in making a very fair start two years and a half ago, and they had great hopes of success, but he thought that they had made rather a mistake in relying too much in the first instance upon what were called the "heads of the Profession," whose own status was of such a character possibly that they didn't feel much interest in elevating the body at large in the social scale. However that might be, or whatever the motives—into which he would not too nicely inquire—those gentlemen deserted them when they most stood in need of assistance and united action. Then came the abortive attempts at an amalgamation, which failed because those who adhered to the College were determined in the first place that they would have an educational institution of their own under the name of a "College," and in the second place, that they would be entirely independent of the College of Surgeons, and of every other body whatsoever. (Hear, hear.) It had been asked, "What's in a name?" But they knew very well that names were employed to describe the things which they were intended to represent; and as it was their determination to have a College, they were resolved that it should be called a College. Those were the two points of contention—the name of the institution and entire independence of action—and upon them they split. Calmly reviewing now all the proceedings with respect to the amalgamation, he really believed that the gentlemen who had abandoned them never sincerely desired that it should take place; for had they remained with them, and had they been animated by a desire to raise the status of the Profession, they might have joined the College at once with great honour to themselves, they would have been a great assistance to its promoters, they would have been the means of bringing the whole Profession into one body, and they might even have had the glory of founding the whole affair. Instead of adopting this course, however, those gentlemen had done their best to injure the College, and those from whom he should have expected better things had resorted to coaxing, to clamour, and to trickery, in order to crush them. He had always been strongly opposed to going to the College of Surgeons for a Dental diploma, for he considered that it was a degradation to insist upon men who had taught others to be Dentists going to the College of Surgeons, which did not pretend to make Dentists. These had been his views all along, and he believed that, unless

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they reverted to their original intention of being an educational body, they would not succeed in the main objects which they had in view. An educational and an examining body they must be, and he thought that in the first instance, at all events, it would be no discredit to them, but quite the reverse, to engage the services of gentlemen of eminence, whose Professional training qualified them to teach anatomy, physiology and kindred branches of science. (Cheers.) Then, having appointed those Professors, let them teach and examine, and let diplomas be granted under proper regulations. These were all matters of detail which must be matured hereafter, but he repeated that they must go back to their first principles, and must rescind entirely those regulations which were agreed to in September last. He admitted that he had agreed to those resolutions at the time, but he did so in the hope of securing unanimity, and, having failed in that, he called upon them to adhere to their original intentions, and to be content to shine by their own light, and not by the reflected lustre of even so bright a luminary as the College of Surgeons. If they shone truthfully and faithfully by their own light, they must succeed, but if they shone only by a reflected light, it would be at best but a sham; and if any man practised the profession of a Dentist who had only the diploma of a College established to instruct in other avocations to show, he might be said, to a certain extent, to be sailing under false colours. (Hear, hear.) In conclusion, he suggested that if they would be a little more liberal in their views with respect to the admission of members, they might possibly enhance the strength of their position. They must not, of course, admit disreputable practitioners, but they should not refuse a respectable man because he did not happen to have sufficient capital to practise on so grand a scale as some members of their body. "Rome was not built in a day," and they had begun with the day of small things. However lofty the edifice to be raised, it must be based upon the ground. It was low at first, but time and perseverance raised it high; and so let them trust to themselves, work with energy, do what was right, regardless of others, and they would be sure to prosper. (Applause.)

Mr Tibbs (of Cheltenham) said, as none of the requisitionists had yet spoken, and as he had been called from a distance of 120 miles to attend the meeting, he should be glad to hear from one of themselves the precise object that they had in view in convening it.

Mr Thomson: One of the reasons for calling the meeting was that a statement had gained currency that a proposition was about to be made to dissolve the College, which I think would be very impolitic and unjust, after the position which we have attained. (Cheers.)

Mr Tibbs: No such intimation has ever reached me. It must

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be only a rumour, and it can scarcely be necessary to summon a general meeting to refute every idle rumour one hears.

Mr THOMSON: It was not an "idle rumour," I assure you.

Mr TIBBS: It did not reach me, and I am a member of the College who has no desire certainly to see it dissolved. (Hear, hear.) I never had any other wish than that it should be a self-supporting and independent institution. I thought that the Dentists of England were sufficiently numerous and influential to stand alone, having no borrowed light, and that they would be held in more respect, even by the Medical Profession, if they stood alone, than they would be if they were attached to any other body, let it be what it will. (Cheers.)

Mr CHAPMAN: I am one of the requisitionists, and I beg to state that I signed the document in question because I thought that the laws passed on the 22nd of September were quite unsuited to the College, and that they ought to be rescinded.

Mr TIBBS: That is a very good reason no doubt, but, unfortunately, you have not stated that in the circular.

Mr HOCKLEY: As I had some hand in the requisition, perhaps I may be allowed to say a few words in answer to Mr Tibbs, who complains that it does not state what we are called here for. Now the requisition does state that those who have signed it are of opinion that the original principles on which the College was founded have been departed from. That is one reason. Another reason is that the observations which were made by Mr Matthews at our last annual meeting certainly did give rise to a rumour, which, although it did not reach Mr Tibbs, did reach a great many members, that the College was about to be dissolved. (Hear, hear.) And further, I am in a position to state that the subject did come under the consideration of the Council, in consequence of the number of seceders that we had. It was necessary that something should be done, for many members of the Council were so depressed at the state of our affairs that they would have been willing to have called a meeting to consider the propriety of dissolving the College; but the Council could not make up their minds to recommend the adoption of that course when they had 170 members and a large balance in hand. It was felt, however, that after the statement which was made by Mr Matthews at the annual meeting, it was necessary to bring matters to a crisis. I accordingly waited upon several members, and got the requisition signed; but that was not done at the instance of the Council; and until this evening not one of those gentlemen were aware of the resolution to be brought forward. (Hear, hear.) I took it entirely upon myself to obtain those signatures, because I thought it essential that something should be done. We have now an opportunity of discussing whether the regulations of September last are right or wrong, and if they are wrong, let us rescind them. If we had continued

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to act upon these regulations, I believe that very few members would have paid up their subscriptions; but if we change our tactics, and revert to our original principles, I hope and believe that we shall go on.

Mr TIBBS still complained that there appeared to be a want of combined action, and observed that, even if carried, the resolution would have to come before them again for confirmation at a subsequent meeting.

Mr HOCKLEY: The gentlemen who signed the requisition met together last night, and determined upon the resolution which Mr Weiss has moved.

The CHAIRMAN: We have been called together upon the allegation, that our original principle has been departed from. Our original principle was, that we were to be independent, and we were not to be a parasitical body attached to any other body, or deriving light from any other body. We have departed from that because we now say that candidates for admission shall be compelled to produce a diploma from the Royal College of Surgeons. That is not our original constitution, and I am sure that Mr Tibbs fully concurs in the sentiment which has been expressed, that we ought to be an independent body. (Hear, hear.) We have quite enough light in ourselves; we are strong enough; we are an intellectual body, and therefore I contend that we ought to have a Dental College independently of every other college. I think, under the circumstances, that the meeting may be considered properly qualified to discuss this question, because we are told that we have departed from our original formation, and that we ought to go back to it. (Hear, hear.)

Mr RYMER did not think that the meeting would be called altogether in vain, because it afforded them a legitimate opportunity for deciding what should be done with regard to the future of the College. With respect to the rumour of dissolution, although it had not reached the ears of many gentlemen in the country, it was very prevalent in London, and with good reason, for every post brought in resignations, and their meetings and lectures until recently had been but poorly attended.

Mr TIBBS: I am very sorry to hear that, for many years as I have been in the profession I should have considered it quite a privilege to have been able to attend these lectures.

Mr RYMER: I am sure, if Mr Tibbs had occupied the position which I have, that he would have been deeply depressed, after two-and-a-half years of anxiety, trouble, and loss of health, at the particular time to which reference has been made by Mr Hockley, and it was under that feeling that I myself was of opinion that it was not just to ourselves or to our families that we, as members of the Council, should be exerting ourselves to endeavour to carry out that which the Profession at large did not appear to be anxious to support them in. I therefore moved in the Council a resolution, which was carried, not absolutely to the

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effect that we should call a meeting to dissolve the College, but which would have enabled us, without any inconsistency, to assent readily to such a proposition. Since then I have been in communication with some eminent men in the Profession, unconnected with any public body whom the rumours in question had reached. And I found that there was a very strong feeling amongst them against the dissolution of the College. (Hear, hear.) I find, moreover, that when the probable dissolution of the College is talked about, that members come forward in greater numbers to attend our meetings. This is somewhat encouraging, and I am still sanguine that our institution may progress satisfactorily. I was only to-day reading the report of the sixty-eighth anniversary of the Medical Society of London, which, I say, has inspired me with hope. I read that when it was first formed it was under tolerably favourable auspices. After a year or two members fell off, but they came back again. Then there was a little unpleasantness, and another society was formed. Upon this several secessions, but at last the old members came back, and they all joined together. In one year during that time the attendance of members at the ordinary meetings was generally seven, but on one occasion it was only four. In one year the funds, which had been at 700*l.*, amounted only to 22*l.*, and the society was deeply in debt; and yet I read a most able and most splendid oration by Dr Routh, delivered last Tuesday week to this Society, which is still existent, and in a flourishing and satisfactory state. (Hear, hear.) I am in a position to announce that a powerful re-action has unquestionably taken place in favour of the College of Dentists. It is looked upon as the only public institution founded on liberal principles which has any chance of effecting a legitimate organisation of the Profession. Therefore any measure which would be likely to sweep away this institution, which, perhaps, could never be founded again, is viewed with feelings of apprehension and alarm. Whilst we have, then, all these satisfactory gleams of sunshine I think that we may safely go forward. (Hear, hear.) I do not assert that all our positions have been wisely taken. We very much regret that we have made mistakes, yet, when you have made a false step, the best plan is to retrace it. We are none of us perfect, either as individuals or as public bodies; and although there is no doubt that we have lost our road, there is a pretty plain sign-post a-head to direct us to the right path. (Cheers.) I think that, by recurring to our original principles, we shall arrive at the desired goal, and I am certain that we shall get back a great number of our old members. I have the original letters of resignation sent in by many of those gentlemen, and they state that they quitted us not because the amalgamation was not carried, but because we had departed from the principles on which the College was originally based. (Cheers.)

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Mr TIBBS: I am now in the possession of information which I was not before, and I hear also that the resolution which has been proposed does in reality emanate from the requisitionists.

The CHAIRMAN confirmed this view, and stated that the Council refused to know anything of the resolution until it was brought before them in a tangible form.

Dr PURLAND expressed his entire concurrence in the resolution, and urged the importance of their being an independent body. There was no doubt that they had been in a very critical position, and he judged of this not only from the number of secessions, but from the paucity of attendance at those most excellent lectures delivered by Dr Richardson. He (Dr Purland) got so dispirited at last, that he didn't care whether the College went on or not, and he had made up his mind to resign his position. (Cries of "No, no.") Latterly, however, the attendance had been greater, and if it continued up to recent point, his energies would increase very materially. He was satisfied that the supineness of the members was to be attributed to the change which had been made in their original constitution. If they wanted their Council to work for them, they must encourage them by their presence. The Council had given them good papers and first-rate lectures, and had been most assiduous in providing everything that was required. The Council, since the formation of the College, had met ninety-three times, and he had never been absent during his year of office. He was persuaded that, if they confined themselves simply to being an examining body, and granting certificates of membership, they would do more good than by compelling the members to follow out such a curriculum as that provided for by the regulations which they wish to rescind. (Cheers.)

Mr TURNER opposed the resolution, which he thought contained a great deal that was unnecessary. It talked, for example, of providing a reading-room and library, and of instituting examinations and granting diplomas; but, as he understood, all that could be done at present under the bye-laws of the College. The resolution of the 22nd September had been passed after a great deal of discussion, and the only reason which he had heard advanced for rescinding it was, that if they obtained their diplomas from the College of Surgeons they would be shining with a borrowed light. He contended, on the other hand, that they would become part and parcel of that great institution; and he did not see any degradation in being a member of one of the most scientific bodies in the world, and the numbers of whose members was legion. He proposed as an amendment, "That the resolutions of the 22nd September remain in full force."

Mr BELL seconded the amendment, but said that he had no idea that the discussion upon it would take place that evening.

Mr TIBBS thought that the resolution proposed by Mr Weiss could not be carried without notice.

The CHAIRMAN concurred in this view. It was evident that

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they could not alter the law without due notice; but under the requisition they might talk about "the present position of the College."

Mr TIBBS: And give notice now for rescinding those resolutions at another meeting.

The CHAIRMAN: Just so. It appears to me that the resolution, as put into my hand, cannot be passed to-night; because the bye laws state that no law shall be rescinded without a meeting convened for that purpose, signed by so many members, and specifically stating what the meeting is for.

(A long discussion ensued as to the matter of form, Mr Weiss and Mr Perkins maintaining that the resolution might be so amended as to express the opinion of the meeting that such and such resolutions "ought" to be rescinded, after which notice might be given: whilst Mr Tibbs and Mr Bell contended that it was not competent for the meeting to deal with the resolution in any form.)

The CHAIRMAN ultimately read the resolution in the following form, and asked whether the meeting would accept it in that shape:

Resolved—That this meeting, being now in possession of all the facts relating to the present position of the College, and feeling that the College, by departing from its original objects and intentions, has been deprived of much of its usefulness to the Dental body at large, is of opinion that the regulations passed September 22nd, 1858, should be rescinded, and that a special meeting of the members be called by the Council to consider such question.

The sense of the meeting was then taken, and it was determined to accept it in lieu of the original proposition.

Mr KEMPTON said that this resolution exactly embodied what he had been about to suggest. He was delighted to hear from Mr Rymer that a re-action had set in, and he really thought that, consequent upon the present ventilation of the subject which had now taken place, they would find a great accession to their numbers.

The CHAIRMAN: I have been in communication with many members of the College of Physicians and of the College of Surgeons, and, with few exceptions, they agree in the principle which we have laid down, that we ought to be an independent body. They say that we have knowledge amongst ourselves, and that we ought to be perfectly independent, in the same way as the Veterinary College; but they state that, in order to carry out our principles, it is quite necessary that we should call in the aid of some members of the College of Physicians and Surgeons to help us in our examinations, until we are able to examine for ourselves. (Hear, hear.) One of our principles, then, is that we ought to be independent. Then membership ought to be extended to all respectable men who are Dentists, who choose to belong to the College, up to a certain period;

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and after that period they should undergo an examination — no matter what the nature of it—but there should be one. I am firm upon that point now, because I see the error I committed before. I highly respect the College of Surgeons, but I do not consider that we ought to borrow light from them when we have so much light among ourselves. I think that the very idea of petitioning that body to grant a Dental Diploma is a perfect fallacy. (Hear, hear). Those who belong to the medical body say that it will never be done. They have had so much annoyance with the special examinations for the Midwifery Diploma, that they do not want to attach any other body to the College of Surgeons; and I do not believe that any gentleman has gone up for that examination independently of his other examinations. Then again, they have laid down rules that you must attend so many lectures at this or that recognised school, and we are perfectly aware, after all, that many of these certificates afford no satisfactory proof of the amount of knowlege acquired by the student. I know that, when I was a student, many never attended the classes, but when they took their certificates of attendances to be signed by the lecturer he was bound to give it. The certificate, therefore, is no proof even of attendance. (Hear, hear.) The Colleges have found that out, and they now say that if a man presents himself for examination, no matter where he has been educated, and passes, he shall be entitled to his diploma. They examine upon the dead body, and they say, "Here are the tools, set to work and do it." That is the way that we must do also if we wish to be independent, and if we act upon the laws which we have laid down, every respectable man who has joined us a certain period shall have his diploma. Whether that shall be effected by means of annual subscription, or by a composite fee, is a matter for the future, but that which you have to decide to-night is whether you will maintain your independence, or whether you will be tacked on to the College of Surgeons.

The resolution was then put, pro and con, and it was carried unanimously.

Mr Runting: We must not lose sight of the fact that, under the Act of last session, we shall not be the only licensing body in London, but that the College of Surgeons will also have the right of granting Dental certificates. Having that power, we ought to know whether they intend to exercise it, and my object in rising is to ask the Council to communicate with the College of Surgeons, to ascertain what their intentions are in this respect. I therefore beg to move—

> That for the information of the members of the Dental Profession, the Council of this College be desired to communicate with the College of Surgeons, to know their intentions with respect to granting Dental certificates, and that, should the College of Surgeons give no satisfactory reply within one month, this College pledges itself to consider the question answered in the negative.

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Mr CHAPMAN seconded the motion, and it was carried unanimously. The Chairman observing that Mr Walpole, who was Home Secretary when the Bill passed, foresaw the difficulty which might arise, and said that it should never be done.

Mr RYMER: Yes, and there is ample security for this, because the Bill provides that the College of Surgeons may, *with the consent of her Majesty's Privy Council*, do so and so.

Mr TIBBS, in proposing a vote of thanks to the Chairman and the Council, stated that he had read in the report of their last annual meeting the allegations which had been made of the manner in which they had been obstructed in the peformance of their duty; and as these allegations had never been answered, he presumed that they were admitted to be true. If so, from whomsoever such conduct proceeded, it was most disgraceful, and he thought that nothing on the face of the earth could be more contemptible. He had not the slightest idea who were the guilty persons, but such conduct could not be too strongly protested against by every Englishman. (Loud cheers.)

The resolution was carried by acclamation.

The CHAIRMAN, in acknowledging the compliment, assured the meeting that no one had attempted to deny the statements which he had publicly made. In fact they could not deny them, for only last week he met another eminent physician, who told him exactly the same thing—that, because he had endeavoured to assist them, an attempt had been made to obstruct him in the performance of that which he thought he had a right to do. (Cries of "Shame.") He told him the very words that were used, and the individuals who used them. Nevertheless (added the honourable Chairman) I hope that we shall live to be a prosperous institution; that our branches will spread like those of the palm; and that we shall expand our protecting wings over many who are now opposed to us. (Cheers).

The proceedings were then brought to a close.

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COLLEGE OF DENTISTS OF ENGLAND.

LECTURES ON THE MEDICAL HISTORY AND TREATMENT OF DISEASES OF THE TEETH, AND THEIR ADJACENT STRUCTURES.

By BENJAMIN W. RICHARDSON, M.D.,

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LECTURE V.

[*Delivered December 14th*, 1858.]

DYSPEPSIA, RHEUMATISM, AND GOUT, IN THEIR RELATIONS TO SOME ABNORMAL STATES OF THE TEETH AND NEIGHBOURING ORGANS.

Mr President and Gentlemen,

I have to-night to ask your attention to the disorders, "Dyspepsia, Rheumatism, and Gout, in their relations to some abnormal states of the Teeth and neighbouring organs."

It will be well in the first place to define the three diseases here specified.

Dyspepsia, a term of "household-word" familiarity, comes with great difficulty under a definition at once simple and scientific. Speaking of Stomachic Diseases, to which diseases the term Dyspepsia is usually applied, Dr Chambers remarks,

"There is no part of the body of which we hear so much from our patients, and are able to communicate so little knowledge in return, as about the stomach. It is an ill-used viscus, flattered in metaphor, and insulted in fact."

The offices of the stomach are various: it must receive the food; it must secrete a fluid having solvent power over the nitrogenous portions of food; and this solvent gastric fluid it must pour out from its mucous coat, or inner lining membrane. But more, it must churn the dissolved food, and pass it on into the intestine; this it does by its muscular or middle investment.

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It has been happily expressed, that in the alimentary tract there are certain great circulations of digestive fluids. The salival secretion furnished by the submaxillary and parotid glands, and poured constantly into the mouth, is not lost, but is taken up again into the circulation to be re-eliminated as required. As food mixes with this fluid secretion, the food is in some measure digested; the mixture has for its destination the blood. In the stomach a more active process goes forward. Here a steady flow of gastric and solvent fluid is poured out, which, commingling with the food and dissolving it, passes with the food into the circulation, and floats through all the tissues virtually to be delivered up again to the tissues. A little lower in the alimentary canal the pancreatic gland and the liver pour in their secreted streams, which have the same destination and meaning, admixture with the food and absorption into the circulation.

The understanding of these points leads to the only approach which can be offered towards a definition of Dyspepsia.

Dyspepsia is derangement, either of the structures by which the digestive juices are secreted, or of the fluids secreted.

The dyspepsia, which is due to changes in the structure of the stomach, is ordinarily of a fixed and intractable character. The modifications on which it depends are organic, and these organic changes constitute a large class. They include softening of the mucous or lining membrane, ulceration of the same, acute and chronic inflammation, constriction of orifices, degeneration of muscular coat, and cancer.

The dyspepsia which arises from modification in the digestive fluids is ordinarily amenable, and constitutes, in short, the common functional dyspepsia. In this dyspepsia the simple fact is, that sometimes food taken will not digest; or that some special foods will only digest. Foods thus undigested, and lying in the canal without work or intention, create irritative mischief, and are expelled by vomit, or transmitted with much pain and discomfort into the hades below. We know but little, as yet, of the disordered conditions of the digestive fluids; sometimes they seem surcharged with acid; sometimes they are in a state of yeast-like change, and are charged with sarcinæ microscopical organic bodies.

There is one other stomachic ailment which exhibits itself as a symptom merely, but which concerns us very considerably. This is the pain known as gastrodynia, a sharp nervous pain, referrable to the stomach or near structures; occurring often after the taking of food, and dependant, as it would seem, upon malassimilation of food, general and special. This gastrodynia may attend the dyspepsia arising from organic change, or the dyspepsia arising from depraved secretion; or it may be present without any very well marked symptom indicative of the changes above named, the result of some particular diathesis, hysterical or neuralgiac.

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Rheumatism, in its ordinary acceptation as a term, is little less indefinite than dyspepsia. We hear of acute rheumatism, chronic rheumatism, and the rheumatic diathesis, as common conditions. We must be cautious here. There is no satisfactory proof that that disease of old people described as chronic rheumatic affection, visiting the joints and muscles during peculiar atmospheric conditions, or after peculiar diets and beverages,—there is no proof, I say, of any direct relationship between this chronic affection and that acute disease which we characterise as acute rheumatic fever. We need not, indeed, consider this chronic affection as relevant to our present studies.

The true rheumatism may be designated, until we know it better, as an acute inflammatory disease, having for its seat of inflammatory development the white fibrous structures. Thus it affects the lining membrane of joints, synovial membrane, the fibrous sheaths of tendon, the sheaths of muscles, the pericardium, or bag enclosing the heart; the endocardium, or membrane lining the inner chambers of the heart; and the periosteum, or membrane covering bone and connecting one bony structure to another,—tooth, for example, to alveolus.

The disease, though it may apparently occur spontaneously, I should rather say without any pre-existing tendency, is undoubtedly connected, as a general rule, with some preceding malcondition, in which the elements of the disease are gathered into proximity, so that slight derangement of system, such as cold or exposure to damp, become all-sufficient exciting causes for the production of the malady in its acute manifestation.

The evidence seems now pretty conclusive, and indeed closer to demonstration than most evidence on diseased action, that the active development of the disorder is due to the formation in the body of a poison which, pervading all parts through the medium of the blood, elects certain tissues on which its special influence is exerted. This view, long held in medicine, was more clearly broached by the late Dr Prout than by any other observer. Dr Prout having studied carefully the cause and nature of the acid fluid secreted so profusely by the skin in acute rheumatism, conceived the idea that this secretion was the true poison in the disease, and that the profuse elimination of the poison was the means by which the blood was relieved of the poisonous material. He asserted that the acid thus excreted was lactic acid, and this theory was supported and opposed by a great many authors for several years. Some light has recently been thrown on the matter by my own researches. Two years since, in studying the question raised by Dr Prout and opposed by many others, the common-sense thought struck me that an experimental test might be set to work to clear up the mystery. If lactic acid were the cause of the rheumatic symptoms, and were in truth a poison affecting the fibrous structures, then the introduction of such poison into the blood of an inferior animal susceptible to

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the disease ought certainly to excite some symptoms of the disease. After several ineffectual attempts to introduce the acid so as to ensure it in taking effect, I succeeded by introducing the acid solution into the peritoneal cavity. The result took me quite aback by its success. Following up the inquiry, I have succeeded in no less than sixteen instances, and without one approach toward failure, in producing in dogs and cats the specific fibrous disorder which in the human subject we should designate as rheumatic inflammation. The heart disease which is so common an attendant of acute rheumatic affection was here present in every case, and the opportunity never before bequeathed to pathologist, was permitted me of tracing out, in each stage of the disorder, as indicated by symptom, the morbid condition of the affected part.

We gain thus, without any theorizing, a pretty clear view of the rheumatic fever and the rheumatic diathesis. The rheumatic disease, in so far as its acute fibro-inflammatory nature is concerned, is produced by the presence of an acid poison which circulates in the blood, and selects certain special tissues for its baneful influences. Further, the poison is a poison generated in the body, and it is probably one of the normal constituents of the body made in excess. It would seem to me that in ordinary cases its excess is determined in the respiratory act, but its origin primarily may, as some authors have believed, be in a perversion of the digestive function.

However this may be, the inflammatory rheumatic attack may be considered as dependent on an acid poison, and the rheumatic diathesis on a tendency or predisposition to a malassimilation or disordered nutrition leading to the production of the poison in sufficient quantities to give rise to the disorder, on the application of a cause of the exciting class, such as exposure to cold or damp, or a debauch. I, for instance, free from the rheumatic diathesis, take cold and suffer from common catarrh, or it may be from pneumonia; my neighbour, in whom the diathesis is marked, takes cold in the same manner, and from the same cause; he has no lung affection, but rheumatism.

The chief peculiarity of the rheumatic disorder is pain; and the chief peculiarity of the pain consists in its acuteness. The pain is like neuralgia as regards intensity, but is different enough in other respects, so that the two cannot easily be confounded. The pain does not take the course of the nerves specially, but of fibrous structures at large; it is ordinarily attended with febrile disturbance and loaded tongue; it is marked by local excitement, such as redness and swelling; it is always increased by pressure and motion in the structure; and it is not fixed in its position, it moves about, always, however, picking out fibrous structure for its site. To-day it is in the knee-joint—to-morrow it is in the wrist—then it is in the heart: a most capricious disease, rheumatism.

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We have said that rheumatism strictly does not take the course of nerve fibre. This is true as regards acute attacks of the disease, but it is not strictly true in every case. There are instances in which a simulated neuralgiac attack appears to be connected with the rheumatic diathesis. In these cases it has been assumed that the nerve sheath is the seat of the pain, and that the rheumatic poison is the agent acting upon the sheath.

In an ordinary way rheumatism takes a certain definite course; it has its commencement, its acme, and decline; it puts itself out of court, but sometimes cheats the court by a treacherous return. As attacking structures connected with bone it often leaves behind it but little chronic organic mischief. As attacking the heart it rarely departs without leaving a train of organic consequences which are irremovable. The system by adaptation becomes used—if I may take this figure of expression—becomes used to the difficulty, but the organic changes remain.

Gout is a form of disease depending on diathesis, and having its acute and chronic designations. It selects bone structure and fibrous membrane and nerve for its seat, but prefers a joint to any other part of the body. Like rheumatism, gout depends on a specific poison, and a poison of an acid character. The researches of Dr Garrod have gone far to confirm this point. It had long been urged that an acid which is an ordinary excrete of the urine, and which is known by two synonyms, viz., lithic acid and uric acid, accumulates in the blood in gout, and is the cause of the acute paroxysm. Dr Garrod has shown that in cases of gout this acid does exist in the blood, from the serum of which it may be precipitated by the simple addition of acetic acid. It has also been shown that the chalk stones left in the neighbourhood of joints in gout cases are a compound of uric acid and soda. Thus, in so far as the detection of a poison, or of the presumed poison is concerned, the evidence is more demonstrative than in the case of rheumatism, and its supposed poison, lactic acid. Yet as to the absolute demonstration, the evidence is again less corroborative than in rheumatism, for although a poison has been assumed, it has not been shown or proved up to the present time that uric acid introduced into the body is capable of exciting the symptoms and pathology of either acute or chronic gout.

The symptom which peculiarly marks gout is, as in rheumatism, pain—and the feature of the pain is its intensity. The pain is attended with the local signs of inflammation—the redness and the swelling, and the heat. It selects usually one joint at one time, but it is somewhat capricious, and leaves one joint for another, or leaving joint altogether sets up a new series of symptoms in a remote organ.

Rheumatism, though a disease of seeming hereditary type, selects no persons for its friendship, but leaves its card wherever it can find a welcome. A most democratic and republican disease this. Half-fed tailors and well-stuffed aldermen are alike its friends.

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Gout has more refined tastes. I don't think it cares much for title, or the shred of nobility, but it claims an unabashed familiarity with the well-fed bon-vivant class. It clings to the bottle, and has a decided preference to old port. If, according to the old myth, every individual disease is a real entity or sprite, which, like Queen Mab, visits everybody whose body affords entrance, then what a jovial sprite the gout sprite must be! What tales he must have to tell to the other sprites; what songs he must know! Now in a barge on the Thames entering into the bones of the bargemen, on the tide of three gallons of porter per day, to say nothing of gin; anon in the palace, and into royal joints, borne on the effervescence of bright champagne. He must be a jovial demon, I say, unhesitatingly, this gout.

There is a notion, not uncommon, that gout and rheumatism sometimes amalgamate and take the same furnished lodgings; where they live under the name of rheumatic gout.

This opinion, broached first by the older writers, was opposed by Hunter, but has been restarted by modern authorities. Later still, the Hunterian view has met with new support. In a late paper, Dr Brown, of Chatham, has claimed the entire independant nature of both diseases; a position already taken by Dr Garrod, and entirely confirmed by Professor Easton.

Looking at all the facts of the case, weighing each side of the question without prejudice, I cannot but coincide with the Hunterian view; not, perhaps, on account of the dogma upon which it was founded, that two similar diatheses cannot be co-existent in the same body at the same time, but on account of the simple evidence in favour of the difference of the two diseases. And, as I believe, so I would now teach, that gout and rheumatism, although analogous, in that they attack the same structures, viz., fibrous membrane, are essentially different diseases, belong to a different diathesis, and are dependant on a different poison for their symptomatic manifestations.

I spoke awhile since of a neuralgia which seemed to be connected with rheumatism; I must not here omit to mention a neuralgia which is clearly connected with gout and the gouty diathesis. When treating of neuralgia we saw that one source of this disease was general or systemic, and I traced out several modes by which the disorder could be produced. I omitted then, by intention, to refer to the general cause now under discussion. To take up this point here, it would seem to be pretty well made out, that exaltation of pain in a nerve—neuralgia—may be pre-eminently connected with gouty tendency. This position has been very clearly and ably broached by Professor Easton, who thus observes:

"In the first place, looking at neuralgia from a general standing point—ascertaining the previous habits, manner of life, and present condition of those who are the subjects of it—listening, it may be, to the tale of hereditary transmission, or hearing of

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the number of victims in the same family circle—noticing the dyspepsia, the occasional hypochondriasis, the unhealthy appearance of the skin, the irritability of temper, the periodicity of pain, and the variations produced in it by different states of the weather—grouping, I say, all these circumstances together, and drawing from them a general inference, we are warranted, I think, in regarding the neuralgiac condition as one of the manifestations of the gouty diathesis The words gouty diathesis I use advisedly, and in express and avowed contra-distinction to what is both popularly and professionally known as a fit of the gout. This diathesis, I suspect, is of more frequent occurrence than is generally supposed; and the opinion of Sir Benjamin Brodie cannot be too strongly impressed upon our minds, that many persons labouring under 'what are esteemed local diseases are, in reality, suffering from the influence of gouty poison in the system, though they may have nothing which would commonly pass for gout.' The quaint remark of Captain Grant, quoted by Dr James Begbie, 'that there dies not one of a thousand of the gout, although more die gouty,' is, I believe, in strict accordance with accurate observation, and has been subscribed to, in as many words, by Dr Gairdner, one of our best writers on gout, who repudiates the notion that we should not consider a man as gouty unless he has suffered under a regular fit of the disease; and states, moreover, his belief, that the gouty diathesis is often very perfectly developed in individuals 'who never see'—he does not say who never feel—'its local manifestations,' expressing, at the same time, his conviction, that the strumous is not more frequent than the gouty habit. My belief, then, is strong, that neuralgia is a manifestation of the same poison which is popularly, though erroneously, supposed to develop itself exclusively in the great toe of the aristocratic, the luxurious, and the sensual.

The opinion, in the second place, that neuralgia is a manifestation of the gouty diathesis, gains strength from the observation of the particular tissue in which the pain appears to be situated. The notion, I believe, is very generally entertained, that in neuralgia, the irritating influence, whatever it may be, is exerted, not directly on the nerve itself, but on its neurilemma or fibrous investment. Now, while I am aware that the gout poison, or at all events that which is looked upon as its material exponent, may take up its residence—or to express it more in accordance with the views which I have already offered—may be eliminated and deposited from the blood in any organ or tissue of the body—in the eye, in the ear, the stomach, and even in cartilages and bursæ—while all this is conceded, I am of opinion, in opposition, I admit, to high authority, that the attacks of gout are more frequently concentrated on the fibrous than on any other tissue of the body, and that, in that particular structure, the poison more especially produces those objective appearances with which

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every one is familiar. Hence, among the victims of gout, the diffused redness which is so often seen, and the severe pain which is so often felt, in those parts of the body where fibrous tissue prevails, over the dorsum of the foot for example, and in the situation of aponeurotic expansions generally." . . .

"That neuralgia and gout are mere symptoms of the same blood poison appears probable, in the third place, and more especially, from the chemical history and characteristics of the particular urinary deposit which was found in great abundance in those cases of neuralgia which have furnished the text of these observations. I presume no one will deny that, in the disease to which the term gout is popularly restricted, uric acid exists in abnormal amount in the blood. Now, without affirming either that excess of uric acid, or that deficient elimination of it, which is virtually the same thing, is the cause of gout, we cannot shut our eyes to the fact, that the existence of that acid in abnormal quantity is an occurrence so constant, that it is very properly considered one of the principal pathognomic signs of the malady."

The three points thus forcibly urged by Dr Easton could not, I think, be put forward with better argument or with sounder judgment.

This, then, is the summary of our general knowledge of the three diseases named in our list; the simple dyspepsia may be due to organic structural change in the stomach, or to derangement in the digestive fluids. The rheumatic affection is due to the presence of a blood poison of acid reaction, and which acts mainly on fibrous tissues, on the lining of joints, and the sheaths of nerves, the acid either being the lactic acid, or an acid strictly analogous. The gouty disposition is also due to an acid, which elects fibrous tissue for its manifestation as a poison; but the acid is of different kind; it is uric acid, one of the matters normally carried out of the body by the urine, at the rate of little more than seven grains in the twenty-four hours.

Without such general knowledge as these facts afford us, it were impossible either to understand or remember the relationship which exists between the dental diseases and the three forms of disease with which we are this evening specially concerned.

There are at least three ways in which dental diseases are connected with dyspepsia.

Firstly—Dyspepsia may give rise to severe temporary toothache by a reflex act.

Secondly—Dyspepsia may cause toothache by direct action of a vitiated fluid upon a carious tooth.

Thirdly—Dyspepsia chronic in character, by keeping up an abnormal nutrition and an abnormal salival secretion, may excite tendency to the development of caries.

The first of these relationships is brought out ordinarily in

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persons who, from irregularity of life or other causes, are the victims of chronic indigestion. In these instances there is, I believe, in all a carious tooth, or an irritable tooth, a tooth, in a word, ready made for an ache. The symptom follows some particular act by which the stomach is overtaxed; the patient is often himself conversant with and describes the cause. If he is not so conversant, the general symptoms unfold the fact. The patient is excitable, his tongue is loaded, his breath offensive, and his appetite bad. He tells, perhaps, of sleepless nights and disagreeable dreams. Not uncommonly he connects the commencement of the toothache with this sleeplessness or disturbed sleep. He wakes from a distressing dream, in which he was the supposed victim of some torture, to find the circumstance verified in an intolerable pain in his grinders, and since then the pain has been pre-eminent, and nothing relieves it.

Or it may be that the tooth, previously irritable, has been started into actual pain by some slight excitant, which prior to the predisposition had no such effect. A draft of cold water, a flush of cold air, the effect of pressure from a hard morsel of food; any simple thing of this character may prove the direct agent in setting up the suffering.

The pain is intense in character, and fixed in one particular spot; local remedies afford no relief; nay, they sometimes aggravate the evil. Extraction relieves the pain from one tooth to transplant it to another. That which most certainly relieves is a vomit, a sweat, or a sharp purge. The junior practitioner in operative dentistry cannot too early make himself acquainted with this variety of odontalgia. He must remember that the pain produced is reflex, that it is central in its origin, and that a tooth need not always be sacrificed to ensure relief.

The influence of dyspepsia in causing toothache by the medium of a vitiated salival secretion may be co-existent with the preceding condition, or independent of it. In the instances where this cause alone acts, the tooth affected is almost invariably carious, and the dyspeptic symptoms, though present, are less acute in degree, and in some measure less fairly defined. In these instances the bowels are generally constipated, the appetite various, the tongue flaccid, and the body enfeebled. The teeth generally are disordered, and often loaded with phosphatic deposit. Frequently, too, a small irritable ulcer is met with in some part of the mouth, in the inner lining of the cheek, or on or beneath the tongue. The salival secretion is free; it gives to the ulcer pain when it touches it, and the fluid is of acid reaction.

In these examples the pain is excited by the direct contact of the salival secretion, and the pain consequently is often relieved by the simplest local measures. What excludes the saliva, or neutralises it, acts best; if one tooth is well cleansed, and then well stopped with simple unpermeable stopping, as solution of mastich on fine lint, gives instant relief and continued relief,

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until such time as the secretion undermines the pledget, and the sensitive surface is again exposed to the irritant.

The influence of dyspepsia in producing caries is exerted in two ways—first, in arresting the nutrition of the tooth, and secondly, in giving rise to abnormal salival secretion. The first of these causes is limited in its effects according to the period of life. It is limited, I believe, to the time of the first dentition extending over the period, *i. e.*, when the deciduous teeth are being exposed and the permanent set are being developed. Amongst the children of the poor, and not unfrequently amongst the children of the upper classes, this agency is too frequently at work, and while it extends to other parts of the body, shows itself especially in the dental organs. The dyspepsia thus induced is mainly the result of an improper feeding. The child deprived of that nutrient fluid, breast milk, so admirably suited by its composition for the nourishment of all the tissues, osseous, muscular, glandular, nervous, is fed with articles of diet which the stomach can neither digest nor the body assimilate. The two important elements of the food, the lime and the nitrogenous constituents wanting, and starchy matter only supplied in shape of tops and bottoms, and other like absurdities, there is a constant waste of the tissues primarily formed, with no corresponding supply. Hence, of necessity, a suspended nutrition and continued waste, under which term is meant simple death or destruction.

Children thus improperly nourished shed their first teeth with these organs often carious throughout, and cut a second set, which are but an indifferent edition of the first.

The dyspepsia, thus effective in its early influence on the dental structures, is in itself afterwards sustained by the malady to which it administered. For proper food afterwards supplied, and improperly masticated, keeps alive the original evil.

Next to the influence of syphilis and mercury, there is no cause so fatal in its effects on the teeth as infantile dyspepsia.

After the permanent teeth are once formed and developed externally, there does not seem much evidence to support the view that simple dyspepsia induces destruction of dental structure by pure arrest of nutrition. The dyspeptic tendency may, indeed, be long marked and well marked, without much important change in the nutrition of structures which are undergoing rapid metamorphosis.

The tooth structures, therefore, which of all others possess what may be called persistency of growth, are sufficiently fed by blood from behind, so that any influence exerted on them must be by the direct action of perverted external fluid secretions. A depraved salival secretion may, indeed, exist and does exist in ill-fed children during their first dentition, and assists not a little in favouring the caries which the faulty nourishment sustains. But in adults the secretion would clearly act alone and solely.

A great deal of discussion has recently taken place in the

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Dental Profession as to the real influence of depraved salival fluid on the teeth, and as to the modification which the saliva undergoes to produce destruction of the tooth structure. The subject is one still open for inquiry, and so far as I can learn is only as yet problematically complete in the following particulars:

That the reaction of the normal saliva is alkaline.

That the saliva may have an acid reaction in some diseased conditions.

That an acid saliva has a decomposing effect on tooth structure.

The acids, which are sometimes found in the saliva during dyspectic states, have not as yet been carefully examined. Lactic acid, acetic acid, and hydrochloric acid have all been stated as present, but the evidence is conflicting, the method used for the detection of the acids is unsatisfactory, and the symptoms present in the cases where the acid secretion was evident, are not given in any instance with sufficient care to render the observations reliable as scientific data. It is quite probable that all, or any of these named acids, may be present, for they are digestive acids of the gastric digestive fluid, and are formed in abnormal quantities in diseases where the assimilative processes are impaired, and they may readily be supposed as susceptible of elimination from the salival glands. I cannot say much about these acids specially, but I know the broad fact, that in many cases of simple dyspepsia, where there is constipation of bowels, where the mucous membrane is inclined to be apthous or to be ulcerated, and where the appetite is irregular, that in such cases an acid salival secretion is the persistent fact. I believe, too, that caries may be induced by a prolonged maintainance of this condition, and it seems rather more feasible that such acid action is the cause of dental gangrene, than the presence of any foreign organic matter lodged in or between the dental organs.

The effect of the mineral and vegetable acids on teeth, and especially on the enamel of teeth, has been studied with some care, but here the research again demands another and more elaborate series of inquiries.

The results of Westcott's experiments, as recorded by Dr Harris, while most interesting in so far as they go, can hardly be said to bear on the question before us. He, Westcott, made out, however, the following facts.

That both vegetable and mineral acids act readily upon the bone and the enamel of the teeth.

That alkalies do not act upon the enamel, but that caustic potash will readily destroy the bone by uniting with its animal matter.

That salts, whose acids have a stronger affinity for the lime of the tooth, than for the bases with which they are combined, are decomposed, the acids acting on the teeth.

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That vegetable substances have no effect upon the teeth till after fermentation takes place, but all of them after fermentation act readily after this acid is formed.

At a meeting held at this College on the 3rd of November, last year, the subject of this effect of acid solutions on the teeth was ably brought forward by Mr Thomson, of Camberwell, and his remarks gave rise to a sound and practical debate. Mr Thomson's experiments are strictly corroborative of the view that even feeble acid solutions destroy the enamel by chemical solution.

We may then safely accept the last proposition that an acid solution has a powerful decomposing effect on the enamel of teeth. Coupling this former fact with the circumstance of an occasional abnormal acid saliva, the relation of caries to dyspepsia through the salival excretion may be allowed in some measure to stand in the light of cause and effect. But the hobby must not be ridden too far, or it will deceive and break down, and the notion cannot be too speedily combated that caries is in all cases produced by such chemical action. This were as absurd as to trace all cases of gangrene of the limbs to the effects of ergot of rye or diseased grain.

Nay, I would say rather, that it is only in extreme cases of prolonged dyspepsia, when such alteration of the saliva occurs as leads to caries by chemical solution.

Rheumatism, in its relation to diseases of the dental structures, may take three positions.

In an acute attack it may seize on the muscles of mastication, or on the fibrous lining of the maxillary articulation.

During the existence of the rheumatic diathesis, the specific rheumatic inflammation may affect the periosteal membranous connection of the teeth and alveolus.

During the same diathesis the nerve sheath of the fifth pair may be the seat of the inflammatory demonstration.

In cases of acute rheumatic fever, I mean in cases even of the severest kind, the muscles of the jaw and the maxillary articulation enjoy an immunity which is striking as compared with the facility with which other and analogous textures are implicated. Yet these parts do not always escape, and it is well to bear in mind that examples where the motive organs of mastication are attacked by rheumatic inflammation are often cases in which the general symptoms of the disease are least developed.

I saw a case of this kind on one occasion which gave me for several days considerable alarm.

A man was brought to me, with what was believed by his friends to be locked jaw. It was a locked jaw, but not a trismus locked jaw. The teeth were firmly clenched, the articulation impossible, and deglutition impossible. There were signs of much

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pain, and there was some swelling in the cheek and about the ramus of the jaw. The disease had been preceded by a cold, but the man had injured his toe a few weeks back, a circumstance which made the diagnosis complicate. The symptoms continued for nearly two days, during which time all attempts to open the jaws were unavailing. The case resolved itself into one of three forms: it might be an example of hysterical trismus; it might be an example of true trismus; it might be an example of rheumatic affection of the muscles and joint, to which latter view the antecedent febrile excitement and the swelling lent their powerful testimony. The mystery was cleared up by the appearance of a rheumatic inflammatory swelling in the wrist Scarcely had this appeared, when a similar swelling occurred in the ancle, while silmultaneously with these demonstrations the fixed maxillary muscles partially relaxed, rendering deglutition possible. The symptoms now fully proclaimed, anxiety was removed, and the case terminated as one of mild arthritic rheumatism.

I should add, however, that the jaw has never fully regained its full action, and that the speech is imperfect in some degree.

The pain of rheumatic kind which attacks the periosteum or connecting membrane of tooth and alveolus, is very characteristic, and is easily defined from the pain of the odontalgia. The pain is dull, heavy, and yet severe. It is a steady pain, and it is a pain which conveys to the mind the idea of compression of the tooth. In inflammation of the dental pulp an opposite sensation is described, the tooth is spoken of as if it were bursting from its bonds; here it is gripped closer by its bony wall, and the patient, as I once before expressed, is quite conscious of an alveolar cavity without any study of the skeleton. The pain is attended with febrile excitement, and often with heat and swelling of the gum. Eventually, some other indication of rheumatic mischief shows itself, some swelling of elbow, or knee, or wrist, and the diagnosis confirmed.

I have, however, seen the rheumatic toothache occur as the only local manifestation of a true but mild rheumatic paroxysm. In such instances the affection will linger about for many days, being uncertain as to its seat in the jaw, now being in one tooth, then in another, and again in the maxillary articulation. Sometimes, too, in this affection, there is a temporary transference of pain from the tooth structures to the ear. When this transference takes place the diagnosis is very much simplified.

Rheumatic neuralgia is the last variety of the rheumatic local affection which concerns us on this occasion. In this case the fibrous sheath of the nerve is the structure implicated. The disease may be developed in the course of any nerve trunk, and of all others is, perhaps, most common in the great sciatic.

But the fifth pair may be the track selected, and the fifth pair may be so selected in its track, as either to suffer over a wide expanse of distribution, "tic," or in one particular branch, as a

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dental branch, neuralgiac odontalgia, confined to one or more teeth being the upshot.

In the rheumatic neuralgia, the pain being the result of excitation in the extremities of the nerves, is modified by local measures. Narcotics and warm applications often relieve—changes from heat to cold, or suddenly from cold to heat, always increase the mischief.

But the point of diagnosis is the variableness of the seat of the pain. The poison being free as the blood, roves with the blood, and wheresoever it finds the most desirable accommodation there it rests. When this variability is met with, when the local character of the pain is discovered, so that the idea of hysteria is excluded, and when the ordinary febrile symptoms indicative of a specific rheumatic poison are present, the diagnosis can rarely be overlooked.

The relationships which exists between gout and toothache, and gout and neuralgia are all important. These relationships are insidious, and have been but recently recognised. Yet they form the most common connections in the links of diathesis and local disorder.

Up to the present time, in speaking of gout and thinking of gout, we have been too much inclined to associate the disease with one unfortunate organ, the great toe. True it is that this member is often the seat of the disease, and true that in extreme cases the toe is more severely affected than most other parts. But in case after case, the medical man who is on the look out, finds that long before this extreme indication of the prexistant diathesis occurs, the story is out in the tale of some slighter and less definite ache.

A man in the first period of the middle age, accustomed to good fare, late hours, and indoor life, was sitting at the wine table in the midst of friends and merriment. For some reason which was not very explainable to him, he took but little part in the mirth; he felt a drowsy low-spiritedness and a slight nausea. Then he had a singing sound in the ears, and some degree of pain in the ear. Suddenly the pain moved in position and increased in intensity. It moved to one particular tooth, and the agony was irrepressible. A strong man before, he was struck down now. He left his friends, and unable to bear the torment, went to the nearest dentist for relief.

The Dentist he called on, a conscientious man, could find no tooth carious, and was opposed to extraction. But the patient, fixing on what he supposed the faulty tooth, insisted on removal, and a sound tooth was drawn Strange to say, the extraction seemed to give relief, and a dose of physic completed the cure for the time. A few weeks afterwards, under circumstances almost identical, the same gentleman had a second seizure; but now the seizure, equally severe, was in the ball of the great toe. Quite unconscious of its meaning, this brief attack, for the pain sub-

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sided in a few minutes, passed without comment; but eventually another return of the pain in the toe ended in an outspoken and obstinate attack of gout. One day when I was visiting him, and talking to him about his symptoms, asking him, indeed, what premonitory signs had warned him of his diathesis, he cut me short with the question,—"Doctor, did you ever see a gouty tooth?" I said "no, I think not." "Then," said he, "I'll show you one," and forthwith he produced the molar, and gave to me its history as I have now recorded it.

I would point out this class of cases to the junior Dental practitioner with all the care I can bestow on it, because it belongs even more intimately to him than to the medical man. To the Dentist the first application is made in such examples as I have here supplied, and the recollection of gouty odontalgia should not desert him. It shows at once the accomplished man to make out a ready diagnosis in instances of this description; and really the diagnosis is not difficult. The circumstances under which the pain is elicited, the character of the pain, the accompanying dyspepsia, the free habit, the healthy tooth, and the inability of the patient to fix determinately on the aching member, are sure indications in the majority of cases of the disease which is presented for treatment.

The neuralgia of gout, manifested over wide expanse of nerve distribution, is of equal interest, and presents nearly the same features as the gouty odontalgia. The neuralgia is local, it occurs suddenly; it alternates oftentimes with other gouty pains; it occurs in persons in whom the gouty diathesis is marked; it is produced by the indulgent habit which recognises not that "enough is as good as a feast," and as a general rule it ends ultimately in the institution of a regular fit of gouty disorder in the smaller joints.

In another lecture, when I shall have to dwell on the structural changes which teeth undergo from disease, I shall have to bring before you a very curious question, not as yet put in dental literature in so far as I am aware. I mean the connection which may exist between exostosis, and some other forms of thickening of the dental structures, and the gouty diathesis.

We are medically well conversant with the chronic diseases induced in small joints by repeated acute, or by slow and insidious attacks, of gout. We have learned that the chemical nature of the gouty deposit in or about bone consists in the simple deposition from the blood of the compound substance, urate of soda; but we have yet to learn whether the same condition which produces these modifications in joints and fibrous membrane extends also to the tooth and its investment. This point, I repeat, I must leave now, but it is one which I could not but notice in this incidental manner.

Let us briefly pass now to the consideration of the treatment of the diseases which have thus gone in review before us.

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In the cases of acute odontalgia dependant on dyspepsia, excited by the indigestion of some variety of food or of drink which remains in the alimentary canal, and refuses to become flesh and blood, the remedy is to remove such material from the canal as early as possible. The cause being stomachic, and the pain reflex, the effect of a vomit or of a purgative dose is often magical. A purgative is the best remedy in these examples, unless there is a decided inclination to vomit, and the best purgative, taking it all in all, is the old pill—of blue pill five grains, of colocynth five grains. Mix well.

This is the immediate remedy; the after and corrective treatment being purely medical, and of much diversity, according to the nature of the case, need not be dwelt on.

The local treatment is simple. The general remedy usually relieves the acute paroxysm, and, this relieved, the tooth, if carious, must be left for after consideration to the Dental practitioner. To extract, or to stop is the common question. The answer to which you know better than I can tell you. I have seen teeth in which the merest dyspeptic attack excited the readiest pain, relieved for a long time, and rendered very serviceable to the wearer, by careful stopping, for as we have seen that where the predisposition exists an external excitant is often required to call forth the paroxysm, so it is but common-sense to protect an exposed tooth as permanently as is possible from the influence of all external irritants.

When dyspepsia is attended with vitiated secreted fluids, and caries of the teeth and pain are a consequence, the general treatment turns much on the cause of the dyspepsia. In the infantile dyspepsia almost everything possible may be achieved by the arrangement of diet. A good milk diet is the grand restorative; coupled with exercise out of doors, which is necessary. In the dyspepsia of older persons, if the saliva is acid in reaction, the occasional administration of a purgative, and the use of simple alkaline mixtures, or of quinine or iron, together with regulation of diet, are the points to be remembered. In the local treatment of these cases thorough cleansing of the teeth is a primary consideration, and alkaline gargles, consisting of a weak solution of ammonia, is of eminent service. Some time ago a great stir was made as to the use of carbonate of soda as a temporary cure for toothache. Mr Gaskoin,* of Clarges street, was, I believe, the first person to point out this remedial measure; and, afterwards, Dr Rigby† supported the same view with very great enthusiasm.

Dr Rigby further suggested that, in cases where the alkalies confer local benefit, the internal administration of the soda is called for; and he gave his own case in corroboration of this view. Afterwards this remedy, being used indiscriminately, fell into bad

* 'Medical Gazette,' Feb. 7, 1835.
† 'Medical Gazette,' Feb. 21, 1835.

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odour, and is now discarded. Subject, however, to proper selection of case, it is a most useful and immediate remedy, while the indications ior its use are as simple as can be desired. If the toothache from a carious tooth is clearly connected with dyspepsia, and if a strip of litmus paper gives clear indication of acid secretion and of acidified matter in the tooth cavity, the application of soda, and the administration of a scruple of soda in water, form, as I have often proved, the most effectual relief remedies of any in the pharmacopœia.

In the infantile dyspepsia, accompanied by caries of the deciduous teeth, a host of evils is removed by the early extraction of the carious family. I believe, too, that in the adult subject, where the enamel is much destroyed, the best cure after all is extraction, in the majority of cases.

The rheumatic affections to which the teeth and other parts of the masticulatory organs are subjected, admit mainly of general treatment and of little else. Practitioners of medicine basing now their treatment on the theory of an acid origin of the rheumatic disease, adopt generally an alkaline treatment, in place of that anti-phlogistic system in shape of blood-letting and mercury, which was at one time set down as the cure and only cure, by all medical law makers. The alkaline plan itself, carried not too far, is, unquestionably, the best practice as yet known. The alkaline salts of potash, soda, or ammonia, seem pretty equally effective.

The point which the Dental practitioner keeps before him in all true rheumatic cases, and in relation to local measures, is, to do as little as possible in the manipulative way. The neuralgia and the odontalgia have an origin beyond the reach of the forceps and out of the range of the scalpel.

In the gouty diathesis (as in the rheumatic) the specific symptoms, wherever manifested, are only to be combated by systemic measures. The treatment of gout, included almost wholly in a correct hygiene, and in the withdrawal of luxuries in shape of king's wine or bargemen's porter, requires medicinally, but the application of the most simple, corrective remedies. A purgative, an alkaline drink, or, in cases where the dyspepsia is marked, a stomachic tonic. These are all that can in reason be suggested.

The local remedies in cases of gouty pain are nil; it is the profoundest principle, both in medical and dental practice, in all the aches and nervous racks which the poisoned blood supplies so provokingly, neither to amputate toe, nor to divide nerve, nor to transfer from socket to pocket the pain-struck molar; it is the best practice, I say, to leave these parts to their chance, to purge out the producing poison, and prescribe to the patient, whether old port man or old porter man, Abernethy's certain exorcism for the gout sprite, "Live on sixpence a day and earn it."

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LECTURES ON THE MEDICAL HISTORY AND TREATMENT OF DISEASES OF THE TEETH, AND THEIR ADJACENT STRUCTURES.

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LECTURE VI.

ON DISEASES OF INFANCY AND CHILDHOOD, AS DEPENDANT ON AND AS INFLUENCING DENTITION.

Mr President and Gentlemen,

The diseases of infancy and childhood stand in intimate relationship both to Dental practice and to Medical practice.

While some forms of infantile and puerile disease depend upon disorders incident to dentition and dental structure, other disorders incident to the body may be considered as in their turn influencing dentition. Our subject matter, therefore, as expressed in the title, naturally divides itself into the two divisions above specified.

Mr Fox, in his excellent work on the teeth, expresses the opinion that, with one exception, the effects of dentition on health are confined to the cutting of the temporary teeth. "The constitution," says Mr Fox, in speaking of the permanent teeth, "has acquired such a degree of strength that the sympathetic action is with more difficulty excited, and the only inconvenience ever experienced is when the permanent teeth, which are placed at the base of the temporary ones, by the increase of their growth make pressure against them; this more particularly happens when the bicuspids are endeavouring to come forward, and being resisted by the continuance of the temporary molares, a tenderness and pain are occasioned, which can only be relieved by extracting the temporary teeth, and thus giving way for the passage of the permanent."

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"The exception to which I have alluded with respect to pain during the second dentition," continues Mr Fox, "is in the dentes sapientiæ; very often a great deal of pain attends the progress of these teeth. When there is scarcely sufficient space for them to grow, or the gum being very thick is firmly bound over them, considerable inflammation, and sometimes swelling of the face takes place. In many cases the pain is so severe as to excite a considerable degree of fever and indisposition. I have known persons confined for this cause only during several weeks. If the dentes sapientiæ of the upper jaw pass through first, it very much increases the inflammation, because whenever the mouth is closed the gums which cover the teeth in the under jaw are bitten upon by the upper teeth, and are continually pinched, the patient suffers severely."

I introduce this passage at length as introductory to this lecture, because, in broad and comprehensive language, it expresses the general fact in reference to the influence of dentition on the body. The general fact could not, indeed, be better given, the picture is in outline, details only are required.

The same author also supplies, in excellent and concise terms, the reason why the first dentition excites so much and common suffering in the infant world. Even the criticisms on opinions prevalent in his day, as to the method in which the tooth emerges from its envelope, are little less applicable now than then.

"The mode in which the teeth pass through the gums," he writes, "is very much misunderstood; the prevailing opinion is, that as the teeth advance in growth, they find their way through the gums by their own mechanical pressure. This idea has given rise to the common expression of cutting the teeth. That this is an erroneous opinion will be perceived when the state of the teeth and gums at that time (the time of the first dentition) is considered. During its formation a tooth is loosely contained in the socket, and can exert no force sufficient to perforate so firm a substance as the gums. The gums possess a certain degree of elasticity, and could by the gradual pressure of the rising teeth be stretched so as to become elongated with the progress of the teeth, and would continue to cover them."

Mr Fox then proceeds to say that the tooth forces its way through by a process of "ulceration," and he very aptly compares this process to another process where a soft tumour, say an aneurismal tumour, by constant pressure upon another structure, even so hard as bone, wears its way to the surface. "When the teeth have advanced so far in their formation as to be too long to be contained in the socket under the gum, they pass upon the membranes which enclose them; these become absorbed, and then the pressure being applied against the gum, that also is removed, and the teeth make their appearance. When the absorption of the membrane and gum takes place early, the child suffers no inconvenience during the process of dentition. The

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teeth advance without any trouble, and their appearance is discovered by the mother or nurse with some degree of surprise. But when the growth of the teeth is too rapid for the absorption of the gums, the dentition is often attended with much pain, and derangement of the whole system."

Another point is also very ably put by Mr Fox; viz., that when the opposition to the progress of the tooth by the gum is very considerable the distention which results exerts itself in two ways; not only on the gum, but on the pulp nerves and vessels at the lower part of the socket. This fact cannot well be impressed with too much force, since it is often the case that the mere appearance of irritability of gum does not in itself indicate the true source of the irritation or of the symptoms which depend on it.

There are two terms used by Mr Fox in the quotations above given which must be corrected. He describes the destruction of gum under tooth pressure as a process of "ulceration" or absorption. In his day the terms were quite allowable, and his meaning obvious. By the present pathological nomenclature we should convey an incorrect impression by the use of the terms. Strictly speaking, the process is one of simple removal of the part by arrest of nutrition. It is neither a process of ulceration nor absorption; in other words, there is nothing eliminated by open wound—ulceration—nor is there anything taken up from the part into the body—absorption.

The process of removal is simpler than either of these two terms would imply. It may be best explained by reference to the normal nutritive act.

When a tissue is being built up out of the blood, there is a steady balance always sustained between the waste and the supply. If the supply exceed the waste, there is congestion, and it may be infiltration or exudation of matter, distributed unnaturally, through ruptured vessels for example, and into tissues where it ought not to be. On the other hand, if the supply is less than the waste, there is in a very short time a gradual disappearance of the structure in which the balance is thus deranged.

When a rapidly growing structure such as a tooth presses upon a soft vascular structure such as the gum, the tooth physically prevents the due nourishment of the soft structures by suppressing, from pressure, the blood supply. Meanwhile the waste goes on as before, and the balance being thus turned in favour of waste, and the pressure from behind being steadily sustained, the result is inevitable loss of the soft structure, and the advancement of the resisting body beneath.

The same law on a grander scale pertains to the nourishment of the body altogether. If from any cause the supply of nourishment in way of food is in excess in some one group of elements, there is, granting that waste is not made proportionate, exudation of overplus out of place in the economy; if, on the other

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hand, the supply is unreasonably reduced, the waste still continuing, the body wastes. The man, however, in this state cannot be said to be absorbed by himself—or to ulcerate—but simply to waste, by a continuance of the normal destructive process without the normal supply.

The analogy thus instituted between general and local destruction is rigid. The gum under tooth pressure *wastes*—it does not ulcerate—it is thrown off particle by particle, by destruction without repair, it is not absorbed by any active or distinct process in the economy.

The effects of dentition in the production of general systemic disturbance afford one of the most striking illustrations of the influence of a local irritation upon the body altogether, and of the intimate sympathies of that nervous tie which binds the various organs into one community. Nothing is more purely local than the act of expansion of tooth and removal of gum—nothing more extensively general than the result.

It is remarkable, too, in what variety of form and in what variety of structure the disease-marks of dentition present themselves. All the great systems of organs feel the shock. Now, the muscles irregularly supplied with the stimulant to contraction, the nerve-current being, that is to say, intermittent, the muscular organs undergo violent convulsive action. Again, the skin, irregularly supplied with blood, is covered with rash. Once more, the mucous secreting machinery being deranged, a diarrhœal flux is the consequence; or the brain circulation being impeded, coma is developed.

Every symptom, however, although diversified in degree and in position, points to one central cause, and has one central cause. The general manifestation or result may hinge on accidental modifications, or, I had better have said, on irregularities, regarding the reason of which we are quite ignorant. But the local cause is simple enough, and is most efficiently proved by observation.

The symptoms developing from the local source show their derivation from irregular nervous supply, not merely by their character as symptoms, but by their evanescence and ready disposal, when the central evil is withdrawn. Disease of a general kind may be developed from one point through the medium of two systems, the nervous and the circulatory. The disease arising from the local cause and passing through the nervous agency, often developed with great violence, subsides on withdrawal of the originating cause. Disease arising from local source, and distributed in symptom by the blood, persists even when the local cause is withdrawn; persists from the establishment of an abnormal nutrition. These two distinguishing points are of moment in the diagnosis, and specially in the prognosis of disease.

The disorders incident to dentition, as they are mainly of the

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nervous class, are excited mainly by what may be called reflex action. The impression made on the tooth is borne away, *i. e.*, to the nervous centre from which the nerve emanates. Thence conveyed by the sensory tract of nerve, it is communicated from the centre to the whole system by communication with other nerves, more or less intimately connected with the prime exciting conductor.

The diseases truly incident to the irritation of dentition may be classified under the following heads :

1. Irritative fever.
2. Some affections of the skin.
3. Some affections of the mucous membrane.
4. Derangements of the muscular system.

The appearance of the symptoms incident to dentition are not very certain in respect to time. We, in medicine, rarely think of tooth irritation as a cause of special symptom until after the infant has passed the sixth month of its life. I am convinced that in this respect we are often wrong; that cases of hasty development of tooth are the frequent fact, and that symptoms excited by the irritation thus produced are overlooked, and attributed to assumed causes, which are, in fact, but symptoms.

The difficulties which stand in the way of the practitioner are, it is true, very considerable, for, owing to the circumstance mentioned by Mr Fox that the pressure is exerted on the nutrient vessels and supplying nerve, the gum itself may not present any inflamed or swollen appearance. Dr Ashburner gives the note of a fatal case of the kind now being considered.

" A fine healthy-looking child of a strong Irish woman died, at thirteen weeks of age, of a convulsive fit. My suspicions as to its having had improper food were not well founded. The mother was anxious to have the cause of death ascertained, and I found no difficulty in obtaining leave to open the body. The organs for the most part were healthy; the stomach contained only a little milk; no error upon the mucous surfaces of the intestines; skin perfectly healthy; the contents of the thorax, as well as those of the abdomen, were quite healthy. In the head there was a slightly injected state of the vessels of the pia mater, but in other respects the brain was quite healthy. The capsules of the incisor teeth were large and very vascular, much more advanced than usual. With a lancet the cartilaginous rim of the lower jaw was attempted to be removed, with a view of exposing the capsules of the molar teeth; but these were so unusually distended with fluid, that the instrument cut into them and let it out. This was an example of development proceeding too hastily."

In the general run of cases, however, it is to be confessed that the symptoms of tooth irritation do not commence before the fourth month, nor extend beyond the third year. In the cases

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where the symptoms are sooner excited the development of the dental structure is to be considered as out of proportion in its rapidity of growth, an event which is much more easily described than accounted for. I confess myself quite unable to give any reason whatever for this precocity of development in some children, and I confess an equal inability to offer any trustworthy sign as evidence that such precocity exists. Dr Ashburner is more decided in his opinion on this point. He sees the result as due to external modifying circumstances, and he records hypothetically one circumstance of this kind which certainly deserves the praise of ingenuity of argument, though it may not go far toward conviction. This author thinks that the accelerated growth of parts in the infant may be induced by the habit of the nurse's system. He gives an instance which he believes corroborates this view.

"I once saw," he relates, "a case of precocious appearance of two incisor teeth of the lower jaw, in a female child of three months old, which was nursed on the breast of a fine stout Irish woman, who had herself had two children cutting teeth at the same age, both of which had died from the rapid progress of dentition. The suckling was a delicate infant, and had a bowel complaint, which induced the parents to change the wet-nurse; and the child throve, and had no other teeth for five months afterwards."

I can myself only consider the facts of this case in the way of coincidences. If it were an universal fact that rapidity of development and evolution are in accordance with the habits of the nursing mother, there ought to be uniformity as regards the period of dentition in each family. More than all, in cases of twins nourished at the same breast this uniformity should most prevail. But neither the one nor the other of these occurrences are at all to be considered as in the order of a general rule.

We must therefore leave this question for the present as we have found it, reserving only for our instruction its practical meaning, which is, that in some instances, owing to a tendency to rapid evolution of the temporary teeth, symptoms of a general kind may be excited at periods ordinarily pre-existent to the appearance of the first lower temporary incisors, and with no active demonstration of irritability or inflammation in the superimposed and unyielding gum.

I do not think there is any case of dentition which is altogether unattended, throughout its whole course, by systemic disturbance. In some cases, truly, the disturbance is so trifling, that, as Mr Fox remarks, the teeth appear without the nurse or mother being aware of it; but this observation must surely refer to the two first teeth, and not to the whole set.

There is some difference as to the teeth which are being cut, and the excitement which results. This obtains in the healthiest children and in the most favourable dentitions. The two central incisors and the two lower canines are, according to my own ob-

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servation, those which appear with most disturbance. Any way, there is set up, previous to and during the evolution of the deciduous teeth, an almost invariable train of febrile symptoms, which may be mild and simple, or may be severe and complicated, and to which the name of "tooth fever" is often applied.

Dr Mason Good was first to point out that nature, allwise and forethoughtful, has made a provision for the moderation of the dentition process, by which much severity of symptom is saved. "The pressure of the pushing teeth is not uniformly exerted through the whole course of teething, but is divided into distinct periods or stages, as though the vital or instinctive principle, which is what we mean by nature, becomes exhausted by a certain extent of action, and then requires rest and a state of intermission."

If the case of dentition partakes of the simple febrile variety of attendant symptom, all that obtains is an occasional paroxysm of heat of skin, restlessness, and perhaps slight cough. These symptoms are common to different periods. When they occur between the fourth and sixth months of life, they indicate the absolute period of conformation of the buried tooth and its tendency to press on surrounding parts. The tooth now may not have presented itself, and the gums may show no indication of irritation. But all observers are pretty well agreed that one instinctive indication on the part of the little patient commonly points out the seat of the excitement.

The child is relieved by any gentle force or pressure upon the gum structure; it bites its coral ring, or it bites the finger of the nurse; and it submits with evident satisfaction to the gentle friction of the finger. This irritability passes away as the tooth protrudes, or rather as the teeth protrude, for the couplet protrusion seems to be the law, and the little sufferer is allowed a respite, in which it regains what Dr Good calls its vitality.

In the course of the protrusion of any tooth, the time when the accompanying distress is most severe is that when the tooth is nearest its approach to the surface, without actually appearing through the gum. Now, such febrile excitement as may be will appear in its full force, and this is its history in medium examples.

There is heat of skin, and dryness of skin; there is craving for fluid, and a liking for fluids that are cold. The gum is, however, by this time itself irritable, and except it is very white from the pressure beneath, is not to be touched without intense manifestation of pain. The infant is restless, the sleep is disturbed; food is often vomited, and cough is slight, but frequent.

Let me add that these symptoms, accompanied with an absolutely presenting tooth, rarely occur before the sixth month, but that after that time they may occur and recur as each couplet of progressing teeth is evolved from the gum.

This is the simple history of the febrile disturbance, and this

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febricula is rarely in itself of moment; it passes off directly the tooth has made its way, and leaves no evil consequences in its rear.

In more severe cases, a variety of complications present themselves. The first and simplest of these is a peculiar rash or eruption, known to our grandmothers and to theirs as the "red gum."

The tooth-rash is a papulous eruption, the technical name for which is strophulus confertus. It differs from another rash commonly called red gum, or strophulus intertinctus, in these particulars. The papillæ are red, but less red than in the last-named phase; they are also smaller, but more numerous, and are collected together in patches on the face, the arms, the chest, and the abdomen. The eruption seems not to be productive of acute pain, but of some irritation or itching when friction is applied. Even the movement of the babe in its clothes, or the officious application of assumed soothing remedies, gives rise to this excitability. The rash once established, though it may disappear with the febrile attack as the prime source of the irritation, the tooth, makes its way through the gum, is exceedingly liable to return on the presentation of another tooth. It rarely does any real harm, nay it is, I think, sometimes conservative in its meaning, it saves other structures from disease, as the lungs or alimentary surface.

Another form of skin disease which may attend the febrile dentition state, is that modified form of erysipelas known as erythema. This eruption consists of an inflammatory blush of deep-coloured spots, raised a little above the surface, and having a tingling and burning character. The disease as it fades away leaves behind it a fine floury desquamation. It is not a dangerous disease, being superficial in its character, and generally limited in its range over the surface. In the cases which concern us at this time, it appears more frequently than in any other locality at the back of the ears, but sometimrs it may occur in the groin. This will be the more probable position if any irritation from chafing has pre-existed. The erythema, like the tooth-rash, passes off with the subsidence of the febrile attack as the tooth irritation is removed, and it is not so liable to return on the renewal of the irritation by the cutting of another tooth. I have never seen or heard of serious results from the erythema of dentition.

Formerly it was considered that the skin affection known under the different names, porrigo, favus, or scald-head, was a direct result of the dentition process. Porrigo, in nearly every instance, selects the scalp as its seat. It appears first in the form of raised dry patches, yellow in colour, and small. The spots are, as it were, partly buried in the skin, and when they are removed, the skin, at the point of removal, has a slight cuplike appearance, and a red shining glaze. The crust is

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called a favus—or in Queen's English, a "honeycomb." This favus increases in size, and at last, by increase, and by communion with other crusts, forms an absolute shield of white scabeous matter, covering perhaps half the head or even the whole. In extreme cases this eruption may extend to the face, or neck, or back, rendering the child very unsightly and uncomfortable. In dispensary practice these cases of porrigo are of daily occurrence.

Well, as I have already said, porrigo was at one time, and is now by the people, considered to be one of the sequences of dentition, and an attendant of the tooth fever. This view is now discarded; at all events we know that the disease is not distinctly traceable to tooth irritation, though it may be coincident with it. The truth about this disease is, that our modern science has shown the disease to be simply contagious, and to consist in the development of a cryptogamous vegetable parasite, named the "Achorion Schonleinii," after Schonlein, who first pointed out its connection with porrigo. This vegetable parasite may be found in the scab or favus, and by inoculation it may be transmitted from one person to another, and made to grow and develope itself in the inoculated subject. With these facts before us we must no longer connect porrigo with the irritation of teething in the light of direct cause and effect. And yet there is one mode of indirect communication which must not be omitted.

In order that the parasite should go on, increase, and multiply, it is necessary that it should have a favourable soil in which to develope. It finds this favourable soil in children of impaired health, from any cause whatever, and therefore in children long worn down by the febrile excitation of a wearisome and painful dentition. I have seen many children who, being affected with porrigo in the later stages of dentition, have been supposed to suffer from the eruption solely on account of the teething. I have seen such children relieved, owing to the general relief obtained by the completion of the deciduous set; and I am not, therefore, surprised that the people should connect the two occurrences together as one condition of disease. You will, however, be on your guard against any such hasty conclusion.

Pustular eruptions on the brow, face, and scalp sometimes occur during the period of the first dentition. There are two forms of the pustular variety of cutaneous disease which may thus be present; these are impetigo, or crusted tetter, and ecthyma, or papulous scale. The impetiginous eruption consists in the formation of numerous small pustules or elevations of skin filled with matter. These may be separate from each other, or remain in patches. The discharge which they produce is thick, and dries readily into a yellow hard crust. If this crust be removed early after its formation more purulent matter will be found beneath it. If the crust be let alone it falls off in time, leaving the skin beneath red.

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There are two forms of impetigo affecting teething infants, viz., *impetigo sparsa* and *impetigo capitis*. The first selects for its seat the neck, or the ears, or the face; the second, as its name implies, selects the head. The crusts thus formed are greenish in character, and purulent matter is always beneath them. The hair does not fall off, and the disease is certainly not contagious. It may be easily distinguished from favus, by its pustular origin and character. During the development of impetigo there is always considerable accession of the febrile excitement, and great irritation, which is much increased by any degree of friction.

Ecthyma may be considered in general terms as but an intensified form of the impetiginous pustule. It has this peculiarity, that the casting off the pustular scab leaves behind a nasty, irritable, and often deep ulcer. Willan, the great writer on skin diseases, gives a distinct form of ecthyma as pertaining to infants, to which he gave the name infantile ecthyma. The eruption in these instances is very freely distributed over the body, and the ulcerated patch discharges a sanious, bloody, thin fluid, which is suppressed with some difficulty. This form of pustular eruption occurs mainly in the very feeble, and is attended with much less febrile excitement than the impetiginous eruption.

The pustular eruptions, although the common attendants of dentition in some families, must not be considered as dependant solely upon dentition. For their production the scrofulous diathesis is required; but when this diathesis is present in marked degree, the eruption, in one or other of its forms, is rarely absent during the whole teething period. The eruption, moreover, is excited by the dentition. There is first erythematous blush, then, as a sequence, pustule; in other words, that which during dentition would produce in a healthy child a mere redness, an erythema, or at most strophulus, sets up in the strumous child the pustular and much more formidable disorder.

I have occasionally seen *boils* developed, in predisposed children, during dentition, excited, as it were, by the irritation of the cutting tooth, and certainly most prevalent and most obstinate during the time when a tooth was offering most resistance. Some two or three years since, there was in all parts of the country an epidemic of boils, commonly called the "feruncular epidemic." In this period infants during dentition were amongst the most common sufferers; but when the dentition was achieved they suffered less, I think, than any class of the community. The fact, if it be universal, as I believe it was, affords a singular illustration of the influence of an exciting cause on bodies predisposed to diseased action.

One very curious case of this kind occurred under my own care.

A woman suffered severely from boils during the whole period

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of her pregnancy. At the time when her labour took place she was suffering from a large boil which gave considerrble pain. Curiously enough, the child was born with a large, unhealthy looking boil, amounting, in fact, to abscess The day after birth I had to open this boil; a considerable quantity of purulent matter was discharged, and the abscess healed. The child, healthy and well made in other respects, continued well until dentition was commencing; then there was reappearance of the feruncular eruption, and I think I may add, without exaggeration, that with every tooth a boil was produced. In the axillæ, in the neck, on the thigh, on the back, in all these positions the purulent eruption occurred. No preparatory treatment would prevent these occurrences, no treatment except liberation of the protruding tooth would in any way suppress the progress of the inflammation. The mere act of cutting the tooth was at all times attended with relief. If the abscess were not advanced far it declined without suppuration; if it had advanced to suppuration it discharged its contents and healed rapidly.

In precisely the same manner, in children disposed to glandular swellings glandular swelling will attend the period of dentition. Such tumefaction usually occurs in the glands of the neck and in the submaxillary glands. The glandular enlargement, once established, is commonly persistent during the full period in which the deciduous teeth are making way; that is to say, from the fourth or sixth month to the second or third year. The gland usually does not suppurate, but remains enlarged and painful, keeping up a constant systemic excitability and fever. The first indications of the strumous taint are thus sometimes manifested; and as the glandular affection may be widely distributed, as it may show itself as readily in the mesenteric glands as in the cervical, symptoms of a serious character, ending in tabes and inanition, may offer their fatal complication.

Thus there are not less than seven varieties of disease, the external signs of all of which are manifested in the skin, having a direct or an indirect relationship to the irritation incident to the evolution of the deciduous teeth. These are—the papulous eruption, known as *strophulus confertus*—the inflammatory blush of *erythyma*—the parasitic disease, *porrigo favus*—the pustular eruptions, known as *impetigo* and *ecthyma*—*feruncular* eruption, or boil—and *enlargement of glands.*

In works on dentition you will perchance find certain other skin affections, as psoriasis, erysipelas, and eczema referred to, as pertaining to dental irritation. Without disputing the fact of the coexistence of these diseases with the dentition process, I cannot but look on them as of rare occurrence, as sequences of that process.

Engaged for the last five years in the heavy duties of the dispensary and infirmary physician, I have had the amplest scope for comparing the attendant diseases of dentition the

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one with the other, and reviewing all I have thus gleaned, I recall only the seven special disorders named above as pertaining to the cutaneous maladies of dentition. In the order of frequency of these diseases, I should place erythyma and strophulus first, the pustular eruptions second, the glandular enlargements third, and the porrigo favus last. When mothers bring their children with what they call erysipelas, the erysipelas usually resolves itself into erythyma.

Sometimes, in the dentition of unhealthy, and even of healthy children, the mucous membrane or lining coat of the mouth, alimentary canal, and bronchial passages is the seat of sympathetic mischief, and not the skin. There is a singular compensation evidenced occasionally in this respect. The affection of skin wards off or relieves some preceding disorder of the mucous surface, and vice versâ. In this way a bronchial attack is sometimes relieved by a pustular eruption; or again, an erythematous blush over the cutaneous surface is removed by a diarrhœa.

The affections of mucous membrane *per se*, which are common to the period of tooth evolution, differ, as regards symptoms, in accordance with the part of the mucous surface which may be the seat of the malady. I notice, however, four particular surfaces which may be the seat of the reflex excitation. I mean, the lining membrane of the mouth—the lining membrane of the external meatus or passage leading to the drum of the ear—the alimentary canal in various parts of its length—and the lining surface of the bronchial tubes. Let us glance a moment at each of these irritations.

In the children of the poor, children in whom the lamp of life scarcely burns—the oil is deficient, the wick untrimmed, and the crucible dirty, dentition and its febrile accompaniment may be connected with symptoms of ulceration, I am driven to see many painful cases of this description, and to recognise them and their cause too readily. In these cases the febrile excitement is very much exaggerated in intensity; the enervation is great, the suffering severe. The ulcerous affection commences, I think, most commonly at the fold of mucous membrane which connects the cheek and gum. Thence it extends sometimes along the cheek, sometimes along the gum, and I have lately seen an infant in which the gum of a presenting tooth was transformed externally into a deep ulcerous patch. These babes, born to be but allowed to live in a misery to which death can scarcely be said to be an unhappy consummation, are victims to a double mischief. The origin of the eruptive malady is not primarily due to dentition, but to improper diet. They are poisoned by food. Removed early from the breast, they are supplied, in lieu of this all-provident food, with mere starchy compounds; they bear up for a time—but the dentition cannot be delayed. Unable to meet this added call on what Dr Good designates their

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vitality, the nutrition of structure yields at any point nearest to the seat of irritation, and ulceration of gum and of the parts adjoining becomes the concomitant of the natural process of tooth protrusion.

The lining membrane of the external meatus, or external canal of the ear, when it suffers from the indirect irritation does not usually ulcerate, but being first inflamed, soon afterwards gives vent to a constant mucus, or semipurulent discharge, accompanied with clear indication of pain, and even with temporary deafness. This mucous excitation may be coeval with the pustular affection, impetigo, and I have heard parents attribute to the discharge from the ear the origin of an impetiginous eruption on surfaces over which the ear discharge had traversed. I believe there is, occasionally, some truth in this view, for the discharge is very irritating, and often offensive. In extreme cases the mischief in the aural passage extends to the drum of the ear itself, and leads the way, in very strumous babes, to the processes of thickening or of ulceration of that membrane, and to ultimate failure of hearing on the affected side. I have seen several illustrations of temporary deafness thus induced.

Irritation in the lower part of the mucous surface of the alimentary canal is one of the best known forms of disorder incident to dentition. The disorder shows itself first in signs of pain, accompanied by great febrile excitement; and, secondly, by flux or diarrhœa. It has become a fashion to transmit from one book to another, that diarrhœa is a sometimes beneficial result during dentition. It relieves congestion, so runs the argument, and reduces fever.

I dispute this position. I do not believe that diarrhœa ever relieves safely, so long as the prime source of irritation, the pushing tooth, remains unrelieved. If diarrhœa reduces fever, that is to say, brings down the pulse and lessens the heat of skin, it does so to lower every function by which life is maintained. Further, this diarrhœa, once established, it is of all discharges the most difficult to subdue by medicinal means. Astringents exert but little effect, and the only chance of stopping it and preventing a fatal issue from wasting, is to find out, if possible, the tooth which is presenting, and give to it relief from its imprisonment. It is true, however, that when through the whole of the first dentition the bowels are irritable, and the stools copious, dark, and slimy, skin eruptions and fever are less severe, while ulcerative affections of the mouth are proportionately intensified.

The irritation of the mucous lining of the bronchial passages occurs often in the earliest period of dentition—occurs long before there is any appearance of a presenting tooth. The symptoms are obscure; the child is first feverish and restless, and wakes with a cough from a deep but disturbed sleep. The mother ordinarily attributes the cough to cold, and it is now and

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then difficult for the most accomplished observer to isolate the true cause. However, the bronchial affection, for the affection of which I speak is a spurious bronchitis, has some indications of its own which in a degree identify it. There is with it no preceding sign of catarrh; the child has been uneasy and showed signs of pain in the mouth; the gum may or may not be red; but the cough, that is the best sign—the cough is short, dry, and spasmodic; occasionally yielding a croupy sound. It is very persistent, it gives in itself but little pain; and it is followed by but little mucus or vomit. There is fever, but the fever is not commensurate with the cough, and, lastly, and most important of all, the disease, if you wait for it, does not give the regular stages of a true bronchitis. It remains, as at first, an irritative cough, dry, frequent, sharp, and unyielding. Relieved by a purge, it returns if the purgation is not sustained, and it disappears altogether as the pressure on the opposing gum is taken off by division, or by the evolution of a tooth.

The deranged actions of the *muscular* system incident to dentition constitutes not always the most prolonged, but certainly the most serious of the incidental maladies.

In speaking of these derangements they are ordinarily considered under the general term convulsion. The term is too general, and expresses but a portion of the evil. It is better, therefore, in order to be accurate as well as concise, to give the clearest explanation of all the muscular derangements which may occur.

According to contraction of the muscle, the derangement may be classified as convulsive or spasmodic. If the muscles affected are moved violently and also involuntarily, they are convulsed—if they are moved and fixed against the will, or contrary to the normal act, they are spasmodically contracted.

Deranged muscular action may be modified, again, according to the position of the muscle, or set of muscles involved. It may be general, in which case it will be accounted as a simple convulsive fit; it may be localized, as in the muscles of the glottis, in which case a special spasmodic laryngismus will be the consequence.

Lastly, a modification may take place according as the consciousness is or is not affected; if the convulsion is general and the consciousness is destroyed, the convulsion will approach more or less to the epileptic seizure.

We have seen, in our previous observations, that the cutaneous and the mucous disorders of dentition are ordinarily attended by a febrile condition. The convulsive and spasmodic derangements differ in some respects in this regard. They may be, and frequently are, attended by fever, but it is not *imperative* that such connection should exist. Many of the mildest and of the severest cases of convulsion met with are sudden in approach and pure in symptom—a convulsion, and nothing but a convulsion—a spasm, and nothing but a spasm. In other instances

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the convulsion is preceded by fever, and in a third class it alternates with some other of the general manifestations of the dental irritation. Thus the muscular affection may alternate with diarrhœal flux. Diarrhœa has stopped, and convulsion occurs; or, what is more common still, the muscular malady runs side by side with the other constitutional disorders. In prolonged diarrhœa from tooth irritation, convulsion is almost inevitably the ultimate attendant.

The force of the muscular disturbance will vary in almost every case, and even in the same case in different paroxysms; moreover, in the same paroxysm the mode and position of the convulsion may vary. That which commenced as a squint may terminate in epileptic form seizure, or that which commenced in a general convulsion may terminate in spasm of one muscle or set of muscles.

Dr Ashburner gives the clearest case I know as illustrating the above facts. He thus writes:

"I attended a fine boy from the cutting of the first incisor tooth to the completion of the dentition of twenty teeth. He was the last child of a family in which all the children had afforded examples of abnormal dentition. This boy was of a nervous temperament, with black hair and eyes. Every tooth had come forward with a want of biliary secretion. Nothing could exceed the care observed by the watchful mother, as to the diet of this infant; yet, whenever an effort at developing a tooth took place she was always aware from the deficiency of bile in the evacuations that he was to have a slight fever, sometimes with a catarrh and cough, always with twitchings of the face and fingers, and starting and moaning during sleep, and a catch in fetching a deep sigh. With the appearance of the first four molares the spasms were more severe. The thumb of the right hand was thrust into the palm, and the fingers clenched upon it; the toes were drawn down; the face was distorted. These spasms relaxed and reappeared. I found, on these occasions, that the tooth was always abnormal in its progress; seldom observing its turn, and never its time. The gum-lancet freely used always cured these spasms. On the last occasion I was sent for in great haste, for the spasms had been continued into an epileptic fit, from which I speedily and effectually relieved my little patient by cutting through the capsule of the coming tooth."

A question has sometimes been raised whether epilepsy, in the truest sense of that term, ever results from dentition. The author I have just quoted inclines to the affirmative of this view, but I cannot think it tenable.

There are at the same time certain cases where a strong predisposition to epilepsy is first lighted up to actual demonstration of the disorder by the irritation of dentition. I have met with one clear illustration of this kind, and with another case in which

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suspicion of the same relationship was prominent, but these are very rare exceptions, and must be received with extreme caution.

In ordinary convulsive or spasmodic paroxysms from dentition all the evidences of epilepsy may be presented. This I grant; but such attack is not true epilepsy, but epileptiform convulsion, a simulation very intimate, but a simulation after all.

In dentition the epileptiform attack is most marked when that serious spasmodic complication—laryngismus, is induced. Dentition in such examples may set up a fatal paroxysm. I will sketch an example which led to a coroner's inquiry.

A gentleman who had removed from Physic into the Church, or I had rather said into the Chapel, for he was at the time I name a nonconformist minister, was on a visit with a friend, a member of whose family was ill from teething. Our ex-doctor, with the old professional duties still haunting him, examined the gums of the sick child and ordered one to be lanced. The gums were all irritable, but one more so than others, so it must be lanced. The operator, a druggist in a little town, lanced freely, as it was stated at the inquest, a different gum to that to which the direction referred. The child was taken home, and in the evening, while sitting on its father's knee with a portion of bread crust in its mouth, at which it was biting with its irritable gums, as babies only know how to bite, fell back with a scream in the father's arms. To use his own expression, it never breathed again, but it showed evidence of continuous life for nearly three minutes, by the violent epileptic form of convulsions into which it was cast.

Another medical man was summoned, but he being from home, some time was lost in coming after me, who lived at a longer distance. When I arrived all convulsion had ceased in death. I opened the windpipe, and endeavoured to restore life by artificial respiration, but it was of no avail.

As I say, the case gave rise to an inquest, and the druggist was accused of malapraxis for not dividing the gum as he had been directed. He was acquitted, and I think fairly; the error was one easily made, and the incision was by no means sufficient to give rise to the result.

The convulsive or spasmodic seizures of the first dentition sometimes extend to the period of the second dentition, and we have already seen in a foregoing lecture that the cutting of the wisdom teeth is occasionally followed by the same results in severe forms. I have not time to dwell further on these topics than to note that in cases where the deciduous teeth are much decayed, where the permanent set are pushing forward, and where these meet obstruction either to their evolution or to that development of the jaw which befits it as the basis of the permanent set—that in such instances convulsion, frequently recurring, may be the fact; may be attributed to worms, may be attributed to temper, and may not be understood in regard to cause, till nature

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does slowly that which the observant practitioner might do with one movement of the forceps.

As I remarked at the beginning of this lecture, the effects of the irritation of dentition mainly attestify themselves through the body by the medium of the nervous system, not by the blood. I take this as a general thesis, admitting, as I believe, of demonstrative proof. And on this I would throw overboard all notion of the origin in tooth irritation of active diseases having their source in the circulating fluid, such diseases, for instance, as hydrocephalus and pneumonia, both of which, by extreme advocates of an extreme view, have, with many others, been traced back to dentition as their cause.

In the list of diseases already given we have surveyed all disorders which without doubt may have a dental origin. It were well, therefore, to rest content with the certainties, and so will we rest.

In the treatment of different diseases resulting from dentition, the art of the dental practitioner, though limited in its application, includes in the majority of cases the key to success. In all instances, where the symptoms I have described attend the first dentition, the primary point of practice is to examine the gums, and freely and boldly to set every irritable gum at liberty by the lancet. I cannot but agree with Mr Fox that the operation of lancing the gums is often neglected in dentition from a timidity which is as weak as it is culpable. The operation gives but little temporary pain (for the gum is not richly supplied with nerves) and the evil consequences resulting from it are comparatively none. The friends of patients often request that the operation shall be deferred for the tooth to present itself more prominently, under the impression that if the gum should heal again the cicatrix will offer great opposition afterwards; this I believe to be a delusion. I have frequently incised gums and given much relief by dividing congested vessels, and these gums have healed up, and teeth have made way again without any greater resistance than in gums undivided. Indeed, the new and annealing matter possesses less resistance as a structure than the original gum substance.

Different practitioners have different ways of making the incision. Some incise the molars with a crucial cut and the others with a straight incision. I think the single incision is in all cases the most practicable, and equally efficient. An incision in the line of the tooth for the molars, and an oblique incision across the bodies of the smaller teeth, answers every purpose.

The only cases where hesitation is required as to the propriety of the operation are cases where the hæmorrhagic diathesis is unmistakably present. Here the operation is unadvisable. In such instances, if the gum is very resistant, the destruction of its upper part may be greatly expedited by touching the resisting

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portion with the caustic point. I have done this on two or three occasions with excellent results.

In those examples which have been before us where deciduous teeth stand in the way of the free evolution of the temporary set, there can be but one line of practice, viz. complete removal of all the obstacles by extraction. The shedding teeth have served their office, and are better away altogether.

The special treatment of the various forms of skin disease resulting from dentition belongs almost purely to the medical man, but there are one or two general rules which cannot be too widely known. These are—1st: That a proper hygiene should always be enforced. Pure air, milk diet, and cleanliness are the grand necessaries, to which may be added, as the case may demand it, an occasional alterative, or a tonic, as iron or quinine. Above all things, friction or stimulation of the skin of the affected part should be avoided. The parts kept clean by gentle washing, treated with the simplest ointment, and protected from the hands of the child, ordinarily, nay, I think I may say always, recover of themselves, when the prime source of irritation is removed and the constitutional degeneracy is restored.

The diarrhœa of dentition is frequently a very troublesome symptom to meet, and can only be scientifically encountered by removal of the dental irritation, and by attention to the same hygienic measures already recorded. When the flux is persistent, however, an astringent tonic may be administered with advantage. I generally prescribe with most benefit, in such cases, small doses—say the fourth of a grain dose—of quinine, with ten or twenty minims of the tincture of catechu, with water. This repeated three or four times in the day really meets the requirement, and beats out of the field chalk, opium, and other remedies of that class, to which custom gives so much preference.

In the convulsive affection the main chance of treatment, again, lies in searching for the source of irritation, and relieving it. It is good practice even during a convulsive paroxysm to pass the finger round the mouth, and if an unyielding gum be felt, then and there to incise it. The immediate danger in convulsion being laryngeal spasm and obstruction to the entrance of air by the windpipe, the immediate treatment consists in supplying pure air freely, and taking every measure to ensure respiration. When there is no doubt of laryngismus, the treatment must be prompt and decisive. If respiration seem to have ceased, tracheotomy and artificial respiration are pre-eminently demanded. If the symptoms are not so severe the spasm may almost always be controlled by the administration of chloroform, which to children may be given with uncommon safety. In a case in which I had the opinion of my late friend Dr Snow I kept a child for no less than forty-eight hours under the influence of chloroform and ether. The effect was magical. The irritation was subdued,

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the spasmodic state ultimately relaxed, and the child, it may be said without exaggeration, was saved from death by the influence of these benign remedies.

The late hour warns me that my remarks on the influence of the diseases of infancy on Dentition must be concluded in a sentence. I am relieved on this score, from the feeling of omission, by the fact that this topic has already been discussed in the first and fifth lecture of this course.

In the first lecture, taking up the great point here brought into our argument, the effects of the eruptive diseases in producing dental atrophy and caries, I explained, as it will be remembered, that, with the exception of small-pox, I could not accept it proved that any one of the eruptive diseases produced the effects so often attributed to them. I urged then, that before any conclusion could be drawn from the cases which have been cited against the eruptive maladies, that before the charge could be sustained, the poisons of mercury and syphilis must be excluded as the causes of the modification of dental structure; and I adduced the further fact, that many children pass through the eruptive disease during the first dentition, and yet present afterwards a permanent set having neither spot nor blemish. Thence I inferred that the connection of atrophy of teeth and carious tendency, stand in relation to the eruptive fevers, not as effect to a cause, but as coincidences to a fact.

Further researches and further thought serve only to confirm me in that opinion.

In this lecture, Mr President, such a breadth of subject has been opened to me—such a volume of important truths—that I have had to sustain supreme difficulties in disposing of the materials before me. The lecture would afford scope for a distinct course, with each section as a text instead of a reading. But if I have succeeded in placing before you the richness of the subject, by shading forth its merest outlines, my object is attained, and I am content.

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MONTHLY MEETING, TUESDAY, APRIL 5TH.

PETER MATTHEWS, ESQ., IN THE CHAIR.

The Chairman having made some observations relative to the business of the evening, called upon Dr Purland for his report.

Dr Purland wished particularly to call the attention of the members to the recent re-interment of the remains of John Hunter in Westminster Abbey; an event which must give the greatest satisfaction to every scientific man, but more particularly to Dentists; for to John Hunter the Profession and the world were indebted for the first really scientific work on the teeth; it was he who had taken Dental Surgery out of the hands of Barber Surgeons, and it was he who had laid the foundation of all the subsequent laborious and scientific investigations which had taken place relative to our Profession; he might most justly be called the father of the Dental Profession. These being his own feelings, and little doubting but that the majority of the members of the College of Dentists entertained the same feelings, he thought that nothing could be more acceptable to them than something in the shape of a lasting memento of the great man to whom the Profession owed so much; he had therefore made up his mind to get a rubbing of the inscription plate on the coffin; and although he had had considerable difficulty in carrying out his intention, he was most happy to say that he had succeeded; he had met with some difficulty in obtaining the opportunity, and also a little in getting as good a representation of the plate as could be desired, on account of the old plate having been refilled with wax previous to his getting to it; he had, however, got a very fair copy with the exception of the coat of arms at the top of the plate, for which he had substituted the portrait of Hunter, engraved by Sharp. He had had the whole framed and glazed, and had now much pleasure in presenting it to the College. [Cheers.]

He had also to report that he had received a copy of the DENTAL REVIEW for the current month, presented by the Proprietors.

Mr James Harley presented a specimen of mineral teeth made twenty-five years ago, also a specimen of coral applied as a base for artificial teeth. He also exhibited an improved form of the key instrument.

Mr Spencer exhibited a new kind of dental saw, with a contrivance for reversing the cutting edge.

Mr Matthews presented a model showing a change of locality in an upper canine and a first bicuspid tooth; the canine having taken the place of the bicuspid, while the bicuspid occupied that of the canine. Mr Matthews observed that we had had the disinterment and the reinterment of John Hunter, and we had had the indomitable courage of one of our members, to get a rubbing of the coffin plate of the great man; that member had had considerable difficulty in obtaining that valuable memento; and he (Mr Matthews) thought that the members present could not, and would not, do less than accord to Dr Purland their most cordial and unanimous thanks for the very handsome present he had made to the College.

A vote of thanks was unanimously given to Dr Purland.

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Mr Matthews also begged, in the name of the members, to thank those gentlemen who had presented smaller things; and would remind them that small things led to greater, and that if all would contribute in only a small degree, we should have, in a comparatively short time, a large museum. He now called upon Dr Blandy, of the United States, to read his paper.

Dr Blandy then read the following paper on Cheoplasty:

THE BEST METHODS OF APPLYING ARTIFICIAL SUBSTITUTES.

The subject of this paper is "The Best Method of applying Artificial Substitutes in the Mouth, in connexion with a description of Cheoplasty."

It has been selected as best suited to the understood condition of practice prevailing in this country, trusting to advance some ideas which may not be altogether new, yet may be serviceable in directing attention to some abuses of certain privileges of our art.

It is not only desirable that all teeth should be servicable as well as beautiful, but the means which are used to obtain these objects should be, at the same time, free from all injurious consequences.

A method which is liable to induce a new evil in its remedial capacity, is not one that the skilful operator can use, nor is it proper that a Profession should countenance a means by which applicants for relief for a certain disease are subjected to the liability of a second equally great. Still, as the loss of teeth is attended invariably by a greater or less injurious result to the general system, by imperfect mastication and consequent increase of labour of the gastric functions, it may possibly become at times advisable to accept of certain conditions in the use of plates for the mouth as the least of two evils. With this view, we condemn the use of clasps for the sustainment or even the contact with the natural organs of any substance used in the construction of artificial plates in all cases where a piece may be sustained by atmospheric pressure, and we are fully persuaded by much experience that the very great majority of pieces worn by clasps, could be as usefully worn without these appendages. We do not think it can be at this time questioned that the use of clasps, is without exception attended by the chemical or mechanical destruction of the teeth supporting them, a like consequence following the contact of plates with the necks or crowns of the natural organs. These injurious results are made evident in a greater or less time, according to the density of the teeth, the condition of the fluids of the mouth, the skill employed in forming the pieces, or the habits of the patients in wearing them, and by the ability of the

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process used to obtain a positive accuracy of fit with a required immobility; but that certain injury must follow, sooner or later, all mechanical contact in the mouth of the teeth with artificial pieces, we presume cannot, from the great accumulation of experience upon this subject, be brought in question. To avoid this at times we admit is sometimes impossible, perhaps one case in ten may be found too difficult to sustain without the assistance of clasps, and doubtless among those supported by atmospheric pressure, many may require great skill from the practitioner and patience from the wearer, but to compensate both there is always the certainty of an entire absence of all liability of injury resulting; a sufficient cause to justify the attempt without clasps, and when found impossible, then resort to them only as a lesser evil than would be inflicted upon the patient by the non-mastication of food from the absence of a complete denture.

It is a most desirable object that the means used to obtain these clasped plates should be as near a perfect one as can be adopted, for the injurious consequences are not only mechanically but chemically induced, not only destructive to the individual teeth connected, by friction, but also destructive to them and to the parts with which they are most vitally connected by the inequality of pressure from these springs, and by improper leverages induced by rudely adapted plates and badly prepared springs, most frequently resulting from the unreliable method used in forming these pieces. A process which requires many attachments or connections is therefore necessarily a bad one, especially if from its frailty it is subject to much springing from applied pressure, because the attachments are alone called upon to do the whole work of supporting the piece, which in time must be followed by a loosening of the teeth thus unduly acted upon, as well as the great liability of chemical and frictional injury to the integral parts of each tooth thus assailed or made use of. Even admitting that such a piece when it rests in its position should be a good fit, still, if it is not strong and stiff enough to resist pressure without yielding, it is unquestionably more liable to produce injury than a piece which fitting perfectly, at the same time is motionless in its attachments from the necessary stiffness to resist pressure, for in the one you have only the fear of chemical injury in a much less degree from its equally good fit at rest or in use, which enables it to prevent introducing particles of food which by decompositon aid every destructive operation; in the other you have an increased liability from chemical causes with an added mechanical friction and undue leverage. Again, a process which requires a large amount of surface in connection with the teeth by clasps and by its

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elasticity, is objectionable as greatly encumbering the mouth, in such a way as to present obstruction to the tongue by breaking the palate surface in such parts as to prevent the tongue from properly directing the volume of air it uses in producing especial articulate sounds, for although this is thought to be also effected by the use of atmospheric pieces, it is not so much so by an immense difference very perceptible in most cases even to the shrewd experimenter upon this point, and easily understood when it is considered that in the one you present a full and complete articulating surface, and in the other you break a perfect by an imperfect surface.

A plate that is worn and supported by a lateral pressure, is, from the before-mentioned reasons, one that must be attended by a much increased liability to effect injury, because it has contact not only by the clasps, but it is constantly exerting a power in opposition to the natural position of the teeth themselves, in all cases productive of more or less irritation to the mouth, at the same time as it incorporates much greater friction than a piece which simply becomes gently attached at the precise moment that it reaches its true position. It is therefore best in using clasp pieces to cover as little of the palate surface as possible, and avoid all unnecessary contact with the teeth, especially in connexion with the lateral pressure too generally applied in the use of elastic materials; close observation will generally discover that such pieces are sustained as much by the binding of the artificial and natural teeth as by the clasps used in connexion with the general contact of the plate along its edges; as a consequence the natural teeth are often found pressed out of their natural inclination and accompanied by local as well as general irritations, followed sooner or later by a loosening of such teeth in their sockets, and by gradual absorption of the soft integuments around them.

The practice of assisting the retention of a clasp piece by running small points of metal in between the necks of teeth, sometimes even passing in front, entirely exposed, is of course to be reprehended as productive of the worst evils; besides being divested of all art, it becomes a mere mechanical fixture that any artizan would have been qualified to make, and properly debars our Profession of its claim to a curative usefulness.

Such pieces are actually destroying more teeth than they support artificial ones, and are always so imperfectly adapted as to invariably expose their artificial character upon first inspection.

To obviate these troubles there are certain imperative requirements; first, a material which has little if any elasticity, lightness, strength,

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and easy adaptability; second, a plate fitting the gums perfectly at all parts of its surface, and having contact with the teeth only at such points intended to be clasped; third, the clasps should but gently bind at the moment the plate meets the gum surface, so as to make a foundation capable from its accuracy of fit of supporting all pressure, the clasps only doing office in supporting the plate to that position, and not affording any support of pressure, because, if *thus* made, they are never required to sustain pressure, but if otherwise, they always do injury by friction and leverage, as well as the invariable injury of chemical action.

The objections to springs are somewhat less radical, because they seldom do an irreparable injury; they are simply in the great majority of cases a useless encumbrance, by impeding the action of mastication, by occasional irritations of the cheek, increasing the necessity of care in cleanliness, by giving additional trouble to the wearer and to the Dentist, and by causing at times unequal absorption of the hard and soft parts of the mouth.

These are but slight objections as compared to those attending the use of clasps, as they are not irremediable, but as they are not necessary difficulties consequent upon the wearing of full sets, trivial though they may be, it were best to avoid them.

Little is ventured in saying that in all cases full upper or lower sets, or both together, can be worn with entire usefulness without springs.

Such pieces require perfect adaptation, each portion of the upper surface should be in contact with the gums and palate, and the teeth made to antagonize in the most regular manner, and at the same moment of time, these simple precautions will be sufficient to ensure the full retention of all full sets without exception, totally avoiding the use of springs.

Of course at times there may be such an accumulation of obstacles as to justify their assistance, found as much perhaps in the prejudices and ignorance of people, as in the physical difficulties of structure in the case itself.

The principles are still the same in those worn with springs and those without, perfection in their fit and perfect antagonism of the teeth, without these cares are had in both, want of comfort and usefulness must be the result, more especially as to the fit, for if this is imperfect the use of such pieces will result in their constant motion, in the inferiority of articulation, and in the constitutional irritation following an unequal action of the absorbents of the mouth.

With these facts it becomes most desirable to use a method which

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invariably gives you the result of a principle upon which you may depend, nor is satisfaction to be found in the use of a process, which upon one occasion gives you practical results and at another impractical, as begetting a universal doubt of all until tried.

Struck plates are, and ever must be, of this kind, the decided differences in the various dies used, the invariable unequal shrinkage of metals used in dies, the undirected yet imperative change produced in swedging, the great law of expansion and contraction under heat of unknown temperatures, the various manipulations struck plates undergo in these formations, are a few reasons why it is utterly impossible to obtain a perfect fit from struck plates.

Carving bases are attended by equally great obstacles, and perhaps are not as capable of perfection in this particular as may be found in swedged plates.

Silicious compounds fused upon certain counter impressions are still worse, as the unequal contraction of all fluxable materials in cooling is such as to yield intense labour to overcome, at all times attended by a much greater want of fit than any other.

The expansion and contractility of all gummy materials when parting with and receiving heat, the application of great pressure, the wonderful difference found in the shrinkage of this material when over or underdone, and the impossibility of a perfect equality of subjected heat found in the hard rubber, together with the great difference in the material itself, some being elastic, brittle, some soft, and again hard, are a few reasons why perfection in fit is not a reliable result with it. But we would prefer that these reasonings should be carried out in detail by each one interested, as we do not wish to be thought assuming an invidious position, or of making unjust comparisons, fully satisfied with the ability of all to judge who will do so candidly.

The adaptation of a plate to the mouth in cheoplasty is always as perfect as the impression taken has been correct, for the treatment of this impression does not allow of any chance product. A reliable principle always gives you the same result in one case as the other, and in this process you are brought to the greatest possible amount of certainty that your plate when finished will be a perfect fit to the model from the impression, which if correct will be the best fitting plate that any process yet known can obtain. The composition used for the matrices is subjected to certain low heat, which it is fully capable of bearing without alteration by warping or shrinkage. The metal itself is also as free from shrinkage as a metal can be made whose melting point is of any moment, and whose mechanical and chemical qualities

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are sufficiently pure to be used as dental plates, so that in all pieces in which the alveolus is not projecting, or in a case of ordinary smoothness, a set thus made will fit as perfectly an exact duplicate model which has not been used as it will the one upon which it has been made, showing by the equal accuracy that in such a case the most desirable result has been obtained. Differing from all other processes, you thus reach an invariable principle, from the fact that the metal is always melted at a precise given temperature, and that it always becomes solid at another; that it obeys this law of its liquid and solid condition under all circumstances alike. From its comparative non-shrinkage a given surface, as may be found in the most irregular palatal, or alveolar surface, for which a plate may be made fitting perfectly at all points whose accuracy presents the possibility of unequal pressure, and consequently must be worn with ease and comfort, as the edges may be formed round and smooth, as is so much admired in bone pieces. It has been much urged, from a superficial and careless view of the principle involved in the retention of atmospheric plates, that weight is a great obstacle. To a badly fitting piece this is true; to a process which is incapable of bringing to bear this principle of atmospheric pressure, every grain of increased substance proves a sufficient objection to its use in many cases, but to one in which this principle is made fully applicable, all the weight possibly involved in any piece for the mouth is not in the slightest degree perceptible to the wearer, so that it is the errors of the method used which proves objectionable, and *not* the *weight*.

A perfectly adapted plate is retained by its *own* attachment, and not by any volition of the patient. Voluntary power must be exercised before a perception of responsibility in the use of that power can be appreciated, as may be instanced in the enormous power employed in the heart's functions, which is entirely imperceptible until derangement takes place, and its principles of action violated. Could utter perfection be reached in a process, many pounds' weight might be sustained in the mouth without perceptible inconvenience, except to the muscles of the neck, for this is the only part capable of receiving impressions of fatigue or distress.

Too many errors exist in not tracing difficulties to their legitimate sources, and, in attributing them to incorrect causes, we often run into still greater error and difficulty.

Too much importance cannot be given to this subject of weight which in the process under consideration must be *carefully* separated from bulkiness, clumsiness, and inconvenience.

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To some methods it is indispensable that you make all these faults to obtain sufficient strength, and in many pieces more recently examined an entire disregard to comfort, use, symmetry, and skill has been had to obtain a sufficient degree of strength and durability, and even then an absolute failure of this has been the result.

In Cheoplasty this artistic construction of a piece is never necessarily violated, for you can always secure a surplus amount of strength without in the least marring the symmetry and entire naturalness of the palate surface.

The very exact form of the teeth themselves can be scrupulously imitated, the useful corrugations of the palate can be given, and the planes and curves required in perfect articulation can all be preserved without encroaching upon bulk or clumsiness.

Of course this involves the highest degree of art which can be employed in mechanical dentistry, and we do not wish to be understood as saying that all these high accomplishments are attained by the mere use of this process only, but as stating that with cheoplasty it is alone possible to reach these ends without defeating the grand points in a perfect fit, unquestionable strength, usefulness, and beauty.

That it supplies skill we know too well to the contrary, from hundreds of clumsy pieces we have seen made and worn, but that it offers the best vehicle in which to display the highest attainment of our art we do not think for a moment can be questioned, because it is a modelling process, and because, with whatever manipulation is had in its construction, the adaptation of the piece to the mouth remains unaffected, for with a correct impression a cast plate of the characteristics of this metal must fit.

It will be easily seen that it is also best adapted for the construction of pieces used in reducing all kinds of irregularity either from within or without the arch, because it enables you always to employ the elastic force of soft rubber, the action of which is best suited to these ends employed as ligatures or blocks.

A regulating plate made by this process is so cast as to press only and at once effectively at such points as are desired, spaces being left for the irregular tooth to assume its desired position in the arch, and the pressure applied by ligatures through the front band, or blocks held from behind forcing the tooth forward, the attachment of the plate being by means of clasps or ligatures, or by perfect fit, as the case may be. The application of this process is almost universal, depending solely on the fact of the possibility of a correct impression.

As to its atmospheric powers, we have briefly stated, the formation of

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clasps when these are used is most simple and effective, because they are cast as they are required, fitting the teeth so employed with the greatest accuracy and strength, the plate must rest firm and motionless in its position, and can be made as employing a less amount of palate surface than is used by any other method, at the same time giving a means of a perfect restoration of lost form.

The economy of this process is a point upon which I feel more disposed to dwell from recent strictures, did time permit, feeling assured that our whole Profession, as well as the great world at large, fully appreciates its great importance.

Briefly, we would state that in time it occupies about the one-fourth of any other process, referring to absolute time employed, which amount decreases in proportion to the number of teeth to be mounted, as the grinding of teeth is the great majority of time expended, and even in this much less than is common to other processes, as the accuracy of fitting the alveolus is not required, being mostly lateral, as the metal is run about them forming a perfect base.

In expense it is about the one-eighth of gold, thus enabling the liberal professional man to accommodate the wants of rich and poor without material reduction of his own profits, giving at the same time the best product of his art.

We do not urge these two last qualifications simply because it saves time and money, which is profit, but because true economy in all things is the perfection of art and the product of high civilisation, and because with these great qualities it has equal merit, to say the least, with those processes which so often consume time and money fruitlessly.

If there are those who are unfortunate enough to have expended large sums in the effort to reach a higher perfection in their ability, it is folly to desire the rest of their professional brethren to make a similar error for the sake of equality of misfortune. That because a process is expensive in its preparation and in its detailed expenditures, and because it is often attended by great failures in its mechanical or chemical workings, that many imperfections attend its results. For these reasons it is not necessarily a process best to be adopted, as is indirectly reasoned by some, or because of its uncertain character it should be commended for conservative reasons, which smack strongly of a vulgar love of profit, without a love for the Profession generally, or for the wants of suffering humanity. As a most worthy gentleman has remarked, "True economy resides in using that which is best, as expense and trouble can be no indication of merit." So true merit when

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cheapest is the best. At least I imagine the world will ever come so to consider.

Indeed a little survey of the history of the practice of medicine will prove that the great expense of some remedial agents has greatly restricted their use. We can refer at the present time to many preparations of gold whose efficacy in some diseases are unquestioned, yet from their great expense are almost totally in disuse, substitutes having been discovered of a much less expensive character.

There is a strange anomaly exhibited in the objection of the use of a metal in the mouth, and even of a compound, by many who are daily in the habit of using amalgams, which, to say the least, are confessedly the most easily acted upon by various agents eliminated in the buccal secretions, a combination is claimed by such to be best suited to contact with the most highly vitalised structure of the hard tissues, and that under a diseased condition, and this combination under these circumstances lasting at times ten, twenty, or even thirty years, and yet object to use the purest combination under the most favourable circumstances.

Such a position is hard to reconcile with the claims of consistency, receiving it in whatever light may be thought proper, yet still believing that such take this ground more from want of thought upon this point than from any course of reasoning, and that in a little time their own interests will become more perceptible in recognising the true merit of a subject; for if one is at all good, the other for precisely the same reasons must of necessity be much better.

It may not be improper to state, in conclusion, that the teeth manufactured for this process are being improperly used by some few individuals in connection with other processes. It were well to understand the claims held by the person owning the patent, desiring that no one should run into difficulties blindly. I beg to state that the patent claims the so forming of teeth by means of holes, grooves, and dovetails as can be retained by means of a fusible material, which covers the ground effectually. Those which have been vended in this country were absolutely made for cheoplasty, and modelled mostly by myself, and should most certainly be so accredited.

Dr Blandy having concluded his paper, said he thought it better not to extend his paper to a greater length, but would be happy at a future time to go more fully into the details of the subject if agreeable to the members.

Mr Matthews: Do we understand that you never use clasps?

Dr Blandy: Yes; clasps are no part of the Cheoplastic system.

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Mr W. Perkins: I understood you to state that in your opinion a plate covering the whole surface of the palate was the best to secure a perfect articulation: do you not think that such a plate offers considerable obstruction when first placed in the mouth, to distinct articulation?

Dr Blandy: It certainly offers *some* obstruction, but in my opinion, very much less than a plate which only partially covers the palate; as in that case the surface against which the tongue moves is to a greater or less extent broken, the amount of obstruction depending upon the degree of accuracy attained in the adjustment of the plate to the surface of the palate.

Mr Perkins: As the success of your system evidently depends on its superiority over other methods in obtaining an accurate fit: may I ask whether the metal employed by you is free from that quality which all metals are known to possess, I mean the quality of expansion by heat and consequent contraction in cooling, as, without it possesses the peculiarity of retaining at any temperature one absolute dimension or magnitude, it seems to me that the same error may occur with your system as with any other.

Dr Blandy: The metal I employ is not absolutely free from contraction and expansion, but it is well known that, by mixing one or more metals together, the expansive quality, &c., is very much diminished, which is the case with the cheoplastic metal, the expansive quality being reduced to the very lowest point, so low that a plate cast on one model will fit so accurately another model cast in the same impression from which the first was taken, that it is absolutely impossible to detect any variation.

Mr Fay, of Brussels, wished to know whether, in the case of a tooth being lost after the piece was made, another could be conveniently and neatly added in its place?

Dr Blandy replied: Most unquestionably, in the most perfect manner; and proceeded to describe the process for so doing; explaining also, that an alteration might be effected in a cheoplastic piece more easily and expeditiously than in any other process.

Mr Matthews: Do I understand that I could have a piece fused on to the old piece?

Dr Blandy: Yes; I have attended many poor persons who were unable to pay. I must tell you, that in America it is the practice to extract all stumps; we will not now enter into the question of the propriety of that practice, but I will state that in one case, having extracted several stumps, I, two days after, placed a new piece in the mouth; I saw the same case eight months after, and was able to rectify the difference of fit, which was considerable, without remodelling the piece.

Mr Perkins inquired if the model was always destroyed in the process?

Dr Blandy explained that in most cases he took a plaster cast from the mouth, from which several models could be taken, and that the model was not necessarily destroyed in making the piece, except in undercut cases.

Mr Fay inquired whether oiling the mouth was not necessary, prepa-

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ratory to taking an impression with plaster, as he thought the mucous membrane might become injured by contact with the plaster.

Dr Blandy said oiling was not necessary, but some difficulty was occasionally experienced in detaching the impression.

Mr Matthews inquired whether Dr Blandy would use plaster for taking an impression of loose teeth?

Dr Blandy would not like to use plaster in such a case without first preparing the teeth with wax; the manner of doing which he explained.

Mr Rymer would wish to know the difference between the weight of the cheoplastic material and that of gold.

Dr Blandy explained that the specific gravity of fine gold was 19, while that of his metal was about 8.

Mr Matthews then said: A few years ago Dentists knew each other only by name or by hearsay, reading only of what our American brethren said or did; but since we have become a College, not only do we know each other in our own country, so as to be able to converse on professional matters in the most amicable way, but even our American brethren have taken so much interest in us, as to induce them to visit us in our own country, to tell us how they have proceeded, and how they have succeeded. We must feel deeply indebted to them for their kindness towards us, and more particularly to Dr Blandy, who has so handsomely come forward this evening to enlighten us upon his new process, promising to go more fully into the subject on a future occasion. I think, gentlemen, that I anticipate your wishes when I propose the unanimous thanks of this meeting to him for the very interesting paper he has honoured us with, and for the very kind manner in which he has answered the several questions put to him by different gentlemen in this meeting.

A vote of thanks having been unanimously carried,

Dr Blandy said: Mr Chairman and Gentlemen: I beg to assure you that I did not come to this country, nor to this meeting, merely for the purpose of speaking of my own invention. I have come to England, not only to speak, but to listen and to learn, and to tell you that the feeling of the American Dentists to the Dentists of this country is one of sympathy, deep interest, and kindness, and particularly towards the Members of this College. The success of the College of Dentists of England they have always most ardently wished for, they desire to see it firmly and thoroughly established, and I can assure the gentlemen here, that if they would one or all visit their brethren in America, the Dentists there would give them so kind and so hearty a reception as they would never forget. I beg to thank you most sincerely for the pleasure I have experienced in this friendly meeting.

The meeting then separated.

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SPECIAL GENERAL MEETING.—April 20.

This Meeting was convened in accordance with the following Resolution, passed at a Special General Meeting of the Members held on March 16th :

> Resolved—That this meeting, being now in possession of all the facts relating to the present position of the College, and feeling that the College, by departing from its original objects and intentions, has been deprived of much of its usefulness to the Dental body at large, is of opinion that the regulations passed September 22nd, 1858, should be rescinded, and that a special meeting of the members be called by the Council to consider such question.

Mr Peter Matthews occupied the chair.

The minutes of the previous meeting having been read, and the Chairman having explained the objects of the meeting,

On the motion of Mr Weiss, seconded by Mr Kempton, the Resolutions passed September 22nd, 1858, were rescinded. After which the constitution of the College was finally determined on, and the various modifications in the Laws as proposed by the Council were adopted. These may be best understood by publishing the Laws and Constitution of the College, as amended.

LAWS AND CONSTITUTION.

I.—The title of this Association shall be the "College of Dentists of England."

II.—The objects for which the College is established, are to unite members of the Dental Profession into a recognised and independent body, and to provide means of professional examination.

III.—The College shall consist of Members and Associates. Honorary Members and Corresponding Members may be elected in accordance with Laws XIII and XIV.

IV.—The privileges of Members shall consist in the right of voting at all General Meetings, of attending other Meetings, and all Lectures and Demonstrations which may take place at the College. Each Member, whose subscription is not in arrear, shall also be entitled to a Copy of the Transactions of the College. Honorary Members and Associates shall have all the privileges of Members, but shall have no share in the direction of the affairs of the College.

V.—The affairs of the College shall be conducted by a President,

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Vice-Presidents, a Treasurer, a Secretary or Secretaries, and by a Council of nine others,* to be elected annually by and from amongst the Members of the College. One-third of such Council shall retire at the end of the year, but shall be eligible for re-election. The President, Vice-Presidents, Treasurer, and Secretary or Secretaries shall be *ex officio* Members of the Council.

Any Member of the College shall be eligible as a Member of the Council, on being proposed by five other Members, such proposition to be sent to the Council one month previous to the Annual General Meeting, and the names of such candidates shall be printed with the House List.

The mode of election shall be as follows:—the Chairman and two Scrutineers having been appointed, the poll shall commence by each Member present personally delivering his balloting paper to the Chairman. Country Members who have the privilege of voting by proxy, shall, if they exercise their privilege, send their proxy-papers under cover addressed to the Chairman of the Meeting. The Chairman shall deposit all balloting papers in the balloting-box. The poll to remain open from half-past seven to nine o'clock in the evening, when the Chairman and Scrutineers, attended by one of the Secretaries, shall retire, cast the poll, and sign the return. In the event of an equality of votes, the Chairman shall have the casting vote.

VI.—The Subscriptions to the College shall be as follow: The payment of 21*l.* in one sum to be considered as a life composition; otherwise an annual subscription of 2*l.* 2*s.* shall be paid by each Member. The Annual Subscription of Associates shall be 1*l.* 1*s.* Members shall pay a fee of 1*l.* 1*s.* on entering the College, and Associates a fee of 10*s.* 6*d.*

All Subscriptions shall be due on the first day of January in each year, and shall be payable in advance. Members and Associates whose Subscriptions are not paid within three months of the date on which they are due, shall forfeit the privileges of membership until the subscription shall be paid. If not paid within six months after it is due the membership shall cease. The Council shall, however, possess the power to re-admit such defaulting member upon his paying his arrears, if they in their discretion think fit so to do, in which case the entrance fee will not be required.

VII.—The Treasurer shall demand and receive for the use of the College all moneys due or payable to the College, and shall keep full and particular accounts of all sums so received. An account in the

* This alteration not to come into operation until January, 1860.

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name of the College shall be opened, and all moneys deposited at a Banker's, to be appointed by the Council.

Laws VIII and IX cancelled.

X.—The names of New Members shall be once advertised in the 'Times' newspaper by the Council, at the expense of the College, within fourteen days after their election. Such New Members shall also be permitted to advertise that they have been elected Members, in the local newspapers of their respective places of abode, three times, at their own expense. The following to be the form of advertisement:

COLLEGE OF DENTISTS OF ENGLAND.

Mr of was duly elected a Member of the College of Dentists of England on the

(Signed)

Secretary, or Secretaries.

Laws XI and XII cancelled.

XIII.—Retired Members of the Profession may be elected Honorary Members of the College by the Council.

XIV.—Such Members of the Profession, residing out of the United Kingdom, as may be considered eligible by the Council, shall be nominated Corresponding Members of the College.

XV.—No person allowing his name to be associated with disreputable advertisements of any kind, circulating hand-bills, or exhibiting show-cases, boards, or placards, combining any other business with that of a Dentist, or acting for or assisting any person who combines any other business with that of a Dentist, shall be a Member or an Associate of this College. And any Member making a public exhibition of the Diploma, or of any other document granted him by authority of this College, shall have his name removed from the List of Members.

XVI.—The Council shall have the power to remove from the List of Members and others those who, in their judgment, may do anything to the discredit of the College, or the annoyance of its Members; but Members so removed shall have the right of appeal at a General Meeting; such appeal to be made within one calendar month of the date of official notice to the offending Member, otherwise the right of appeal will be lost.

XVII.—An Annual General Meeting shall be held in January (at such time and place as the Council shall appoint) to receive the Report

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of the Council; to elect Officers for the ensuing twelve months, and to transact the general business of the College. Such Annual Meeting may be adjourned by resolution thereof from time to time, in case the business brought forward should, from any cause, not be concluded.

XVIII.—The Council may at any time call a Special General Meeting; and they shall at all times be bound to do so on the written requisition of ten Members, specifying the nature of the business to be transacted. Notice of the time and place of such Meeting shall be sent to the Members at least fourteen days previously, mentioning the subject to be brought forward; and no other business shall be introduced at such Meeting.

XIX.—At every meeting of the College, or of the Council, the resolutions of the majority present shall be binding (excepting only in the case referred to in Law 23); and at such meetings the Chairman shall have a casting vote, independently of his vote as a Member of the College, or of the Council, as the case may be. Members of the College residing beyond twenty miles of Charing cross shall be entitled to vote by proxy for the election of Council and Officers; and upon all questions at General and Special General Meetings upon a poll being demanded in writing signed by five Members. In case of such poll being demanded, it shall be the duty of the Chairman to name a convenient day and hour on which the poll shall be opened and closed.

Law XX cancelled.

XXI.—The Council shall have the power to make Bye-Laws, but such Bye-Laws shall not contravene the spirit of the fundamental laws; fill up vacancies in their own number, and in any of the offices, and transact the general business of the College.

XXII.—Every person upon being admitted a Member or an Associate of this College shall sign the following Declaration:

"In consideration of my being admitted a Member or an Associate of the College of Dentists of England, I hereby undertake to agree to and abide by the Laws and Bye-Laws of the said College.
Signed."

XXIII.—The College shall not be dissolved unless two-thirds of the Members shall vote for its dissolution.

XXIV.—No change shall be made in these Laws, except at a General Meeting of Members of the College specially convened for that purpose.

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The following Laws, to become part and parcel of the constitution of the College, were also passed :—

MEMBERSHIP.—*All Dentists* in actual legitimate practice on the 20th day of April, 1859, shall be entitled to become Members of this College without examination. The Council to determine all questions relating to legitimate qualification for membership by such practitioners.

Gentlemen who have not commenced practice as Dentists on the 20th day of April, 1859, shall be required to undergo an examination as to qualification to practise prior to being admitted Members of this College.

The Regulations for examination shall be under the entire control of the Council.

ASSOCIATES.—The Council shall have the power to admit as Associates of the College, without examination, assistants of Dentists, engaged as such, or qualified to be so engaged, on the 20th day of April, 1859.

After the 20th day of April, 1859, no person, except those qualified as above, shall be admitted Associates without passing an examination on dental mechanics. The nature of the examination to be determined by the Council.

Associates of the College and *Assistants* of Dentists shall be eligible for *Membership*, upon passing the necessary examination.

A cordial vote of thanks to the Chairman terminated the proceedings.

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LECTURE VII.

[*Delivered on January 11th*, 1859.]

ON PURULENT AFFECTIONS OF THE GUMS AND ADJACENT STRUCTURES.

Mr President and Gentlemen.

There are few questions in Pathology more involved in obscurity than certain ones relating to that pathological condition, marked by the development in the body of a specific fluid known as pus, and designated by the Medical world as purulent disease. At the same time there is no condition more commonly evident in practice, and concerning which more has been written. Under so many circumstances is the formation of pus a leading process, that the mind of the practitioner is led almost to look upon such formation as a normal occurrence, incident simply to antecedent mischief.

A wound is inflicted into soft structure; the wound bleeds for a time; the bleeding stops, but the edges of the wound not brought together, and not healing by what is called the first intention, there is soon produced in the open wound a free secretion, very simple in composition, resembling ordinary mucus in its general characters, and serving a protective purpose; shielding, in fact, the open wound from air, and by such conservation arresting that ultimate resolution in death known as the putrefactive change. Or a foreign body is lodged in a deep-seated part, a disintegration of tissue is the result, a cavity forms, and on the surface of that cavity there is set up an analogous change; a simple fluid is produced, and lines the inner wall of the cavity. A short time elapses, and in either case this simple fluid is transformed into the purulent secretion, into pus.

The nature of this transformation is the point most obscure. Like the first formed and simple fluid, the new product can have

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but one source: it must be derived from blood; the vessels supplying the locality in which the pus is presented must needs yield the material, for were this not the fact the formation could not be continuous. The secretion (for, for the moment, we may call pus a secretion) must be eliminated in the capillary system of vessels. A section of capillary surface has taken on glandular function, and a secreted fluid is the consequence.

The analogy which exists between the purulent secretion and blood itself further establishes the source of the secretion. The pus, like blood, contains albumen, contains a body having some resemblances to fibrine, contains water, contains corpuscles resembling intimately the white blood cell; it contains fat, contains salts common to blood, as carbonates, phosphates, and chlorides, especially chloride of sodium; contains sometimes iron, and to complete the parity, possesses in the normal state an alkaline reaction. What definition shall we give to a fluid so singularly constituted, let us venture on a bold description; let us express in a sentence a whole book in disease; let us call pus, *modified blood*, and purulent exudation modified *hæmorrhage*.

We must not, however, in this generalizing spirit be led to the opinion that pus is exuded from blood as pus. We protect ourselves from this error in again representing the pus-secreting surface as a glandular surface; and in stating that the blood, leaving its channels as blood, is transformed into the purulent fluid at the suppurating part.

At the same time we must not be led into the error of presuming that the formation of pus is an act purely local; and that blood out of which pus is produced is normal in all its characters.

These views would, either one or other, be equally extreme; nor is it easy, even admitting this, to indicate the precise relationship which obtains between disordered conditions of blood and affections marked by purulent formations. It is, perhaps, the nearest approach to the truth that can be made in the present state of our knowledge to say;

That there are conditions of blood in which, irrespective of local injury or disease, the tendency to purulent transformation is broadly marked.

That in normal states of blood there are local changes which are capable, by an effect exercised on the blood supplied simply to the local part itself, of exciting a purulent secretion in such part, the compounds of which secretion are derived from blood.

That there are certain states of body in which there is general disposition of blood to purulent secretion, and at the same time in the body certain local points in which the formation of purulent secretion is largely favoured: or, to put the whole ques-

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tion into one proposition, that pus cannot be produced without blood as the supplying food, and organized structure as the transforming medium.

An illustration of the first of these conditions is given in the instance of what is called feruncular epidemic, *i.e.* where a disposition to the formation of pus, in form of abscess or boil, extends over a whole country. Here the general demonstration of the fact, and the variation of place in the bodies of affected persons, proves the mode of production to be general, and the local affection to be mainly accidental.

An illustration of the second of the conditions named is supplied in the instance of simple suppuration of a wound in a healthy person.

An illustration of the third variety is offered in cases where, in unhealthy states of body, the suppurative tendency is developed in the immediate vicinity of a portion of diseased structure; as when, during depraved health, abscess and ulcerative suppuration occur around teeth which are necrosed or carious.

Now that I have enumerated and illustrated these three relationships between the blood and the secretion produced out of it called pus, I have said all, pretty well, that is really known. I could certainly lead you into very refined pathological argument on these relationships; but then I should be leading you from the practical teachings of these lectures for no more desirable a purpose than display of erudition, and this too on topics which could not, by all the erudition in the world, be fully explained at the present time. I shall therefore leave the points I have laid down as a curt summary of what is known; adding only one more observation bearing on what has preceded.

While we cannot trace out the nature of that condition of the blood which gives rise to purulent formations, we are informed by observation of the external conditions which foster it. We have learnt that the pus-producing disposition is an indication of deterioration of blood. We see that when the system is enfeebled, whether by diathesis hereditarily supplied, as by the strumous diathesis—whether by epidemic influences—or whether by deprivation of nitrogenous food or the inhalation of bad air—that under these circumstances the tendency to purulent deposit in local structures is marked, and that, in extreme instances of the kind named, the act of suppuration may take its absolute origin from blood thus depraved.

Hence we have reduced almost to a principle in medicine, the saying that suppurative tendency is a sign of an impaired or vitiated nutrition. Hence also we reason in speculative argument, that pus is blood transformed into a lower form of organization, and we adduce in evidence of this view, that the purulent fluid is incapable of organic construction, and that animals in which the respiration, the circulation, and the animal tem-

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perature are more than ordinarily active, the formation of pus, even in an open wound, is an occurrence almost unknown.

Formation of purulent fluid may occur in a variety of animal structures. Yet there seems to be a law on this point; viz., that pus only is produced in the presence of a nitrogenous structure.

Thus pus is formed under skin, in the great cavities, as in the chest or abdomen; in the centres of organs, as the liver, or kidney, or lung; in lymphatic glands, constituting abscess or boil, in or upon mucous membrane; or in firmer structures, as in bone. It would be more difficult, in short, to tell where pus will not form, than where it will.

When the purulent formation has commenced moreover, and is continued, the force with which it is secreted is very considerable. This is best shown when the fluid formed is hemmed in on all sides, as when it is formed in a gland, or in a bone cavity like the antrum of Highmore. Increasing in such position from day to day, and exerting a steady and even pressure on surrounding parts, its physical influence is astounding. It will force through flesh, force through bone, burrow under muscle, and disintegrate gland.

The old writers in physic noticed that pus, in exerting its pressure, always seemed to make its way towards the surface of the body, as if, argued they, to discharge itself and be gone. The general observation is mainly correct, but the argument based on the observation is shaky. Pus confined in a shut cavity, and increasing in quantity by addition from the blood, must exert an equal pressure on all opposing surfaces. But as in a cavity there may be certain part of its walls in which the resistance is least, so there will the effect of the pressure be soonest manifested. Hence, under the cutaneous surface of the body an abscess points ordinarily outwards, because, in consequence of the equal pressure from within, resistance is least offered at this particular spot.

The symptoms indicative of purulent formation are, ordinarily, constitutional as well as local. According to common observation the general symptoms appear to take precedence, and hence the local symptoms are often referred to the general symptoms, as having in the general symptoms an origin or cause. This supposition is not truly correct, nay, it may be incorrect altogether. It may be that, in many instances, the general symptoms are indications of the systemic recognition of a local but not fully developed lesion. Or it may be again, that the constitutional disturbance is coincident with the local, both having a common origin in one common source, as the introduction of poison into the blood, or the effect of a wound in which restoration by the first intention is not the fact.

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I speak now of general symptoms accompanying the purulent form of disease in its acute demonstration. There are other symptoms of the systemic order which follow the fact of purulent formation, and are solely dependant upon it for their existence. These two classes are widely different in character, and deserve special notice.

The symptoms accompanying the local manifestation of pus in its acute form are those of active febrile excitement. The patient is first depressed, then he is cold, next he shivers, and soon complains of pain in his limbs and back. The shivering, if slight, is designated simply as a shivering fit; if it is prolonged and severe it is called a rigor. The intensity of the rigor is, as a general rule, an indication of the extent of the forthcoming evils; if the rigor is well marked and severe, the sequelæ are correspondingly important. To this rule, however, many exceptions will occur to the practitioner, all based on individual susceptibility and temperament. Thus, in full sanguineous men, a trifling rigor may be followed by the most alarming local demonstration and purulent secretion; while, in hysterical women and nervous, irritable men, a severe rigor may be the precursor of the most temporary local change. In such individuals as I have thus specified last the development even of that purulent affection known as gum-boil is not unfrequently preceded by systemic symptoms which might in others stand for abscess of a visceral organ.

The subsidence of the first class of the general symptoms marks ordinarily the period when the local symptoms commence. Hence, as the systemic symptoms come on first, it is not always that one can predict the local lesion which shall follow them. With the development of pus a continued irritative fever is established, which, modified in degree, is marked by special signs, by loaded and white tongue, thirst, heat of skin, and prostration. If the pus is formed in the centre of a structure and is confined, the irritative febrile state first dependant on the local derangement is sustained by the irritation set up by the pressure from within, and does not cease until the pus finds its way to the surface and is discharged from the body. If the pus is on an open surface, the acute symptoms pass away on the free development of the purulent secretion.

In the majority of cases, after pus has formed and has found an escape or vent, the acute systemic signs disappear and convalescence is the result. But to this rule, again, the exceptions are many; the character of the symptoms being only changed, and convalescence being retarded or prevented altogether.

If, for example, there be at the root of the local mischief some cause, in shape of a foreign body, the purulent deposit may be sustained and the discharge may continue. Now the train of systemic signs takes on a new form. There is no persistent

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febrile excitement, but depression with intermissions of excitement, hectic fits, as the common phrase goes; now the patient runs the hazard, in extreme cases, of succumbing from absolute excess of secretion, the purulent exudation is a modified hæmorrhage, and the result, if continued, is wasting and death.

If, again, to take another example, the purulent secretion, after having found vent from the system, is sustained by pre-existing depravation of blood, the same result in a modified way is the great fact. We said in a previous lecture that loss of blood feeds on the loss, and that the more the system loses of its blood, and the longer it loses its blood, the longer is the tendency to hæmorrhage perpetuated. The same rule obtains in regard to the formation and the elimination of pus; the greater the amount of secretion, the greater the tendency to exudation. The disease feeds on itself.

Thus it happens that in the half-fed children of the poor, and in the strumous children of the rich and poor alike, the difficulties in arresting purulent exudation are very great. The cancrum oris of poor children attended with the ulcerated mouth; or the purulent gum attended by the necrosed or carious tooth, are classes of cases of the description here given, the mention of which will recall all the circumstances which have been now detailed.

There are yet two other phases in the symptoms succeeding purulent exudation, to which attention must needs be called. It does now and then occur that purulent matter, effused into some firm structure, finds no vent, or but an imperfect one, and, being confined in the part into which it is effused, undergoes transformation, and becomes putrid. This result is most common when the deposit of pus takes place in the neighbourhood of the bowels, but it may occur in other positions. There is then a further result, the putrid purulent matter becomes a veritable poison. In these instances, the purulent decomposing matter yields an alkaline substance, which, absorbed into the system, excites all the characteristic signs of typhoid fever; not the febrile excitement, understand, referred to as accompanying the development of pus, but a low fever, having all the characteristics of a typhoid, with dry and dark tongue, ammoniacal breath, petechial rash, delirium, and the tendency, too often demonstrated in the reality, to death by coma.

The last phase of disease resulting from purulent deposit consists in the development of the systemic affection known as pyæmia. This affection is assumed to be produced by the direct absorption of pus into the circulation. Many experiments have been made to imitate this affection by injecting pus into the veins of animals, and it is to be gathered from an unbiassed view of the whole of these experiments, that by this operation a series of symptoms closely resembling those of pyæmia may be excited.

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At the same time, the experiments thus instituted do not prove the theory of the absorption of purulent matter from one part of the body to another, but rather a disposition of the body to the formation of pus in different parts of the solid structures at the same time.

The symptoms which attend the disease are those of the low fever type, and I may add that the symptoms, in the majority of cases, end fatally. Sometimes the symptoms are prolonged, and the prostration which ensues is marked by profuse colliquative sweats, with febrile intermissions. But, as I say, death is the ordinary result; and after death deposits of purulent matter are to be found in a variety of parts, as in the structure of the lungs and in other soft and vascular organs.

This disease, pyæmia, is rarely seen in private practice. It is the deathly exhibition of a vile hygeine, to common hospitals in crowded localities, or to hospitals themselves crowded with patients. There are some foul hospitals in these of her Majesty's dominions from which pyæmia is rarely absent, and in which it breaks out in such awful virulence that every patient who comes under the surgeon's knife is, for the time, a doomed man.

Summing up, then, the general symptoms which are common to purulent formations, we see them divided into two groups:—into a primary group, preceding and accompanying the purulent formation, and consisting of febrile excitement, more or less tonic in character; and, into a secondary group, in which the symptoms may assume three phases; simple exhaustion from absolute excretion of pus, and attendant pain, marked by hectic and gradual prostration; typhoid symptoms from decomposition of pus and absorption into the blood of one of the alkaline products of such decomposition; and, lastly, pyæmia, or the extensive developments of purulent deposits in various parts of the tissues, and death with colliquative flux and rapid disintegration of tissue.

The local symptoms which attend the formation of pus, are, like the general, of two kinds, the active and the passive. The active are tolerably uniform in character. They consist, first, of tension and throbbing which eventually merges into severe and lanceolating pain. The pain is, of necessity, greatly modified according to the part in which the pus is being produced. If the part is richly supplied with sensitive nerves, the pain is intensely severe, and *vice versâ*.

There is also increased heat in the part, and there is swelling.

None of these symptoms, as a general rule, disappear until such time as the pus finds vent. Then they disappear as by a charm, and the patient sleeps in the luxury of a relief which has to be felt to be appreciated.

Occasionally, however, as we have seen, the symptoms do not terminate by discharge of the purulent fluid. The purulent secretion is confined in its position. Under these circumstances,

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the more active symptoms may disappear, such as the redness and the throbbing pain; and there may be left only the swelling and the passive pain due to tension from the pressure of the fluid confined in a closed cavity

When pus has found its way to a free surface, and can escape readily, the local symptoms, now rendered passive in character, are modified according to circumstance. If the discharge be perfectly unimpeded, there is no great demonstration of pain, but there is change of tissue at the discharging point. The purulent matter being from a wide surface as over a large patch of the cutaneous surface, or mucous surface, the true lining structure is removed, or as the common saying goes, is ulcerated, and the pus is spread over the ulcerated cavity. Beneath the pus is a reddened surface raised into little eminences, and called the granulating surface. If the pus is from a cavity, and is discharging by an opening at some outer part, the lining surface of the cavity from which the fluid comes has the same granulated character throughout.

The pus itself changes materially in its physical qualities and in its appearance. In its healthiest form, or when according to set phraseology, it exists as laudable pus, it is of a yellowish colour, heavy, having a specific gravity approaching that of blood, viz. 1·030 to 1·040, a freedom from any streak or stain, and no odour. In other cases, the pus is tinged by the colouring principle of the blood, and is then of reddish cast. In a third class of cases the pus is from the first, or after a time, of watery, whey-like consistency—ichorous pus, so called by the term makers.

Lastly, the pus may be putrid, when it is of dark colour, thin fluidity, and disgustingly offensive to the smell, being charged with ammonia in the form of hydrosulphate.

The appearances presented by the purulent secretion should be always carefully noted, since they afford, often, a clue to certain constitutional peculiarities upon the which the result of the case may mainly turn. Thus the fine clear, yellow, inodorous purulent secretion affords indication that all's well within—that the local mischief is healing kindly. The purulent matter which is blood-stained indicates, if the stain is not simply accidental, that there is a readiness on the part of the blood to effuse from its vessels. The watery secretion points out that the systemic forces are low, and the putrid secretion forewarns the practitioner that, if free elimination is permitted, the typhoid poison symptoms will not remain long in the rear.

From the consideration of the preceding particulars regarding the formation of pus, and the general and local symptoms which attend such formation, let us turn now to the narration of those forms of purulent disease which are of practical moment to the practitioner of dentistry.

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In regard to the teeth and the structures adjoining them, purulent disorder has the following relationships.

1. To abscess of the antrum maxillare.
2. To abscess of the dental pulp.
3. To abscess in dentine.
4. To purulent deposit around the tooth in alveolus.
5. To purulent secretion on the mucous surface of the buccal cavity.
6. Abscess beneath or near the jaw externally.

The first, and perhaps, taking it all in all, the most serious of the purulent affections classified above is that accumulation of purulent matter in the antrum of Highmore of the superior maxillary bone, known, ordinarily, under the term abscess of the antrum.

This disease is less common amongst youths and children than amongst adults. It is not, at first, a disease very easily diagnosed, and even in late stages it sometimes presents many and perplexing difficulties in the way of symptom.

The causes of the affection are at least three, possibly more; viz., obliteration of the duct leading from the antrum to the nose, and accumulation of serous secretion in the cavity and subsequent irritation; secondly, the presence of the fang of a carious tooth; thirdly, injury done to the bony wall of the cavity. To these causes constitutional diathesis must always be superadded.

The formation of matter in the antrum of Highmore is preceded by inflammation, and this inflammation is not in the bone structure but in a delicate membrane of fibrous texture which lines the cavity throughout and supports the vessels and nerves with which the bone beneath is supplied. The symptoms of abscess of the antrum were very carefully studied by Mr Hunter, and were described by him in a manner which has never been surpassed. The pain produced in the early stages of the disorder is very often mistaken for toothache, and this is specially the case (I am following now Mr Hunter's faithful history) if there be a bad tooth on that side. In these cases, however, as the same author acutely observes, the nose is more affected than is common in simple toothache. The sensation in the nose is described by patients as of fulness and tenderness within and in the affected half. There is a desire to blow the nose frequently, but this impulse, if followed very much, intensifies the pain, and throws back the pain upon the cheek. The pain extends to the eye and to the frontal sinus causing in the forehead what is known as frontal headache. Preceding, or at least accompanying these indications, there will be present, in greater or lesser intensity, those general signs of febrile excitement which have already been described.

After a time the physical local signs of the disorder are made manifest. There is first a red blush of the cheek almost in the

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centre, and this is followed by hardness and swelling. As the swelling progresses the acute pain may subside into a permanent suffering wanting in intensity but made up in persistency. The cheek is, as it were, bursting from within, surrounding parts are displaced, the one half side of the nose is flattened up, the movement of the upper lip is impeded, the orifice of the mouth may in very bad cases be altered in shape, while the eye may be so pressed on as to suffer serious injury. These are the symptoms in their extreme manifestation. Dr Harris has pointed out that when the nose is forcibly blowed, or when the head reclines on the opposite to the affected side, there may be discharge of sanious or purulent matter from the nose, and this he considers when present as a valuable sign of the disease. I do not find this occurrence noticed by other writers, but on the contrary, I find most writers stating that in almost all cases of accumulation of fluid in the antrum, the passage leading from it to the nasal cavity is filled up. However, I bring forward Dr Harris's statement out of respect to him as one of our best dental authorities.

There are two affections with which this purulent affection of the antrum may be confounded; viz., simple increased secretion of serous fluid in the antrum, and malignant tumour. The first of these affections cannot, without operation, be distinguished from the purulent formation, and it may even vie with the purulent affection in the extent of disfigurement or pain produced by it.

The second, viz., malignant tumour, may be, with care, diagnosed by certain signs peculiar to itself. These are, slower progress of symptom, pain at first intermittent and not referred specially to any one point, a diffuse swelling of the cheek rather than at one concentrated point, an absence of relief by effusion on making an opening into the antrum, and, lastly, the evidence of cancerous diathesis, as derived from the previous and present history of the affected person.

I would remark at the same time that these points of diagnosis are not always certain. I remember seeing a case in which pus being presumed to be present in the antrum a molar was extracted, the antrum was perforated through the alveolar cavity and a small quantity of pus did escape. The opening was kept free, and there was for many weeks an effusion of fluid supposed to be thin or sanious pus. But recovery did not take place, and the after symptoms gave out the tale that the disease in the antrum was of malignant type. Time is often, in fine, the only reference in cases such as these.

When pus has formed in the antrum and has been removed by operation, and when a free opening has been made for the exit of more secretion as it may form, it is astonishing how readily and happily the parts which have been disfigured reassume their normal shape. I had the opportunity not long since of seeing, with our excellent President, a case in which this

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fact was peculiarly well marked. A woman, in whom abscess of the antrum on the left side had produced a degree of disfigurement rarely witnessed, was relieved of her burthen by removal of a molar tooth and by retention of a free opening. Mr Matthews had the gratification of seeing this disfigurement gradually pass away, and by this time his patient has regained her pristine beauty, the which, having never been in excess, is to her all the more valuable.

When there is accumulation of purulent fluid in the antrum the pressure which it exerts is made towards exit in two directions, viz., towards the external wall of the cavity, *i. e.* toward the cheek, or laterally, *i. e.* through the bony wall into the nose. However, it often happens, unfortunately, that the fluid accumulates and the parts around continue obstinately unyeilding.

Abscess of the dental pulp, is a form of purulent affection, but indifferently recognised by the distinguished Hunter. The occurrence of this kind of abscess is certainly rare, nor do I think that, as a purely localised disease, it has as yet been fully described. Mr Fox seems to have referred to it under the term spina ventosa. He says, "Spina ventosa is the term usually given to that species of tumour in bone which is originally an abscess forming in the centre, the ulcerative process removing the bone from the inside while there is a correspondent increase on the outside;" and other authors, following Mr Fox, have continued to use this term in a similar way. Mr Bell long since pointed out the folly of this nomenclature, and the folly truly is sinful. The term spina ventosa was first applied by the Arabian writers to express a peculiar swelling of the bone; spina to express a pain resembling the pricking of thorns, and ventosa to indicate that the swelling, under the touch, conveyed the impression of a bag filled with air. A windbag the whole affair certainly is, and specially so when applied to the abscess of the dental cavity. It is probable that the term spina ventosa was originally applied to the disease of joint known commonly as white-swelling, or it may have meant necrosis of bone with purulent secretion in the medullary canal; anyway the term is ridiculously inapplicable to abscess of the dental cavity, and should be driven out of our literature forthwith, without hesitation.

True purulent disease of the dental pulp seems to occur in an acute and chronic form. In its acute manifestation it is the upshot of inflammation, which inflammation, as it shall arise from accident, from exposure by caries, or from constitutional disorder, may partake, as Mr Tomes has well pointed out, of a local or a general type. If the inflammation of the vascular pulp occur in a closed cavity, *i. e.* in an uninjured or rather unbroken tooth, the inflammation and the resulting suppuration is general. If the pulp structure be exposed at any point the inflammation and the resulting suppuration is local, the product of the inflammation having, in a word, the facility of making its escape as it

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forms. It is of moment to remember these two divisions, since the symptoms and ultimate results are widely different in the two classes of cases. In the general suppurative disorder, there are developed all the acute signs of a vehement inflammatory attack, accompanied by intense pain, and febrile excitement and even severe rigor. Here, as the purulent secretion forces its way, it finds in the opening at the fang of the tooth the most yielding point; here, therefore, the matter, if it escape at all, does escape; thus it finds its way into the alveolus, and alveolar abscess is the next apparent complication. The tooth, now deprived of its vascular supply from both within and without, dies forthwith. I trace out here the extreme end of a case of general suppuration within the dental cavity.

In the local form of suppuration of the pulp, on the other hand, there may be pain, and the pain may be very great when irritation of the pulp is made; but as the purulent matter is discharged as it is formed all the severe symptoms disappear presently, and are not seriously illustrated unless some cunning operator, in the zeal of his skill, turns a stopcock on the discharge by filling the carious cavity with a firm plug.

I should be neglecting an interesting subject, were I in this place to pass over without notice a form of disease of the dental pulp, called by Dr Harris, and first described by him "spontaneous disorganisation." In these cases the pulp structure is slowly destroyed by a process independent of inflammation, and its place supplied by a fluid matter of dark brown colour, of little odour and having the consistence of cream. In these instances, several of which appear to have been presented to Dr Harris, the sockets do not seem to be affected, but the teeth assume a "dull, brownish, or bluish brownish appearance," and the gums over the alveolar border of the affected teeth have a pale greyish-purple colour, without softening or congestion. The persons in whom this affection occurs are usually, according to the learned author who first described this disorder, under twenty years of age, and of pale or sanguineous cast. The affection, moreover, is not often confined to one tooth, but "occurs simultaneously in corresponding teeth." It is confined principally "to the incisors and cuspidati, and sound teeth appear to be as subject to it as those which are carious."

Dr Harris very correctly opines that the disease in these examples is the result of constitutional mal-condition. This must be so, but the condition or diathesis requires to be more fully made out. Is the systematic cause struma? Is it poison; the poison of syphilis, or mercury, or lead?

The formation of purulent matter in the structure of the dentine has been asserted as possible by Professor Bell, who adduces a case of the kind in proof. Mr Tomes has also shown the same occurrence in the tusk of the elephant. But as this

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affection is to the last degree rare, I dismiss it with this passing recognition.

The presence of purulent secretion in the alveolar cavity may be accounted for in different cases, in many different ways. We have seen one mode by which this result is brought about. We have seen that purulent matter in the cavity of a tooth may force its way through the openings in the fangs of the tooth into the alveolus; thus exuded, the fluid wedges its way towards the gum, and breaking up the alveolar connection sets the tooth free in the socket, and of necessity, by cutting off nutrition from without and within, causes death to the whole structure. But, as I have said, there are many other sources of alveolar abscess, and these must be known.

Amongst these remaining causes may be mentioned—1st. Injury and inflammation of the alveolus itself with subsequent necrosis. Here the mischief may not destroy the tooth, if the nutrient vessels supplying the central part of the tooth are not involved. 2nd. Injury, or other accident, leading to necrosis of tooth and subsequent destruction of the alveolar connection, and purulent infiltration. 3rd. Disease in the fang of a tooth, and the presence of foreign bodies. 4th. Inflammation of the connecting membrane as the result of poison in the blood, as the poison of small-pox and mercury.

The symptoms of alveolar abscess, known better by the vulgar as symptoms of gum boil, are moderate or severe, according to the cause. They are of two kinds, general or local, as I have described already. If the purulent formation have its origin in the dental pulp and the abscess become alveolar by an absolute forcing of the excreted fluid into the alveolar cavity, no symptoms are more severe than those which attend this alveolar affection. The pain deep, pulsating, lanceolating, bursting, is not easily described in words, nor is the relief which is obtained as the pus escapes of ready description. But when the purulent formation is confined to the alveolus, the pain, though still acute and throbbing, is more superficial and more bearable.

In either case the presenting matter, wedging its way by the side of the alveolus and tooth, and finding itself opposed by the overlapping gum, pushes that yielding structure before it, and produces what is known as gum boil. The distention of gum gives rise to new irritation, which is not removed until the gum gives way.

If an operation for setting at liberty the purulent matter is not performed, the matter discharges at last of itself by one of two ways, either by an ulcerative opening through the gum structure, or by separation between the gum and the tooth which it encloses. If the latter result obtains, the passage for the discharge remains free and easy, for as Hunter well observed, the gum never again becomes permanent to the tooth; if the matter

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exude through broken gum, the wound made may heal when pressure is removed, and the old miseries may be revived.

The practitioner may here learn an excellent lesson in reference to the mode of operating for gum boil. The proper plan being, not to pass through the gum with the scalpel, but to separate gum and tooth with the gum lancet as in the simple act of scarification previous to extraction.

The symptoms I have here described are those of acute abscess in the alveolus. But there is another and chronic form of the disease, in which pus, formed at first with some pain round or near a diseased tooth, remains and extends involving other teeth without any very great manifestation of suffering, but producing much discomfort and a secondary affection of the gum important in its way.

It will be remembered that when I was treating of hæmorrhage and the hæmorrhagic diathesis, I explained that there was a variety of hæmorrhage arising simply from disease of the vessels of a part and not from any disordered condition of the blood itself. Now this condition of vessel, and this variety of hæmorrhage is common to the chronic purulent affection to which reference is at this time being made. The gum, imperfectly nourished, becomes spongy in texture, bleeds on the slightest provocation, and presents all the local appearances of the true scurvy gum. This kind of gum is, indeed, often most improperly called scurvy gum, and treatment is adopted for it which for rank empiricism of principle has nothing for its equal.

Mr Humby has recently done me the kindness to show me a patient in whom chronic purulent disease of the alveolus involving the gum, as I have just explained, existed for a long time and presented at last many points of great practical value.

The patient in this case was one Edward Chester, a youth of eighteen years of age, by business, a clerk in a warehouse. He came before Mr Humby at the Royal General Dispensary. He stated that in early life he suffered from small-pox, and at nine years of age he had rheumatic fever. His father, a dissolute man, died many years ago, and a brother and a sister have also died. The first symptoms of tooth affection commenced when he was ten years of age. His teeth became dark in colour, brittle, and carious. He did not suffer much from toothache, but occasionally this was a symptom. At this time, and since, his general health has been good, but the gradual disorganisation of the teeth progressed, and in time all the teeth in both jaws were involved excepting the upper bicuspid on the left side, the second upper molars on both sides, the second lower bicuspid on the left side, and the first lower bicuspid on the right side. After seven years, *i. e.*, when the lad was entering in his eighteenth year, purulent matter began to form around the diseased teeth, and the gums became soft, spongy, and so vascular that they bled on the merest touch. This condition constituted what was con-

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sidered to be the scurvy gum, and the patient seeing in the window of a dog doctor the history of a famous lotion invented by the said doctor for the scurvy gum, went in to be cured by a lotion, and came out to have his bad teeth as effectually finished off by art, as any dog doctor, aided by strong sulphuric acid, could devise. The lotion applied to the gums by this ingenious charlatan contained, in fact, the acid I have named. In its application to the gums it gave great pain; it set the teeth on edge, it turned the gums of a blue colour, and it removed the enamel from all the teeth with which it came in contact, so effectually, that the mouth may be virtually considered as destroyed, since any endeavour to save the majority of the teeth is bereft of any chance of success. The cast of the mouth of this youth is now before the members.

In the case here recorded, we have an illustration of purulent disease giving rise to symptoms closely resembling those which characterise true scurvy gum.

There is yet another class of cases in which the true scorbutic disorder sets up purulent deposit. In the case of a patient recently under my care for purpura, bleeding spongy gum was one of the marked symptoms. When this symptom was most marked, the alveolus became affected, and purulent fluid soon separated several of the teeth from their alveolar connection. Under general treatment the purpuric symptoms subsided and the teeth were saved. This satisfactory result, which I have seen before, is attributable to the fact that the tooth continues to receive its central nutritive supply. I believe, however, that in after years, teeth which have been separated from their alveolar connection are much more ready to decay under external influences, and they sometimes loosen and fall out with comparative suddenness and without expectation.

We have several times had before us the question of the influence of the eruptive diseases on dental affections. I recal this point merely to note that in small-pox, exfoliation of the alveolus and consequent purulent formation is an occasional result.

In past days the same often happened from the injudicious use of mercury, and one shudders to read the quiet stories of Astruc, about men who were fumigated into purulent puddings, whose teeth dropped in a row at a time, and whose decomposing gums and jaws emitted an odour which rendered life more intolerable than death.

We have passed the day of these living recitals of ignorance, and now, though salivation is practised in some forms of disease, it is never carried so far, by intention, as to lead to consequences so seriously absurd as those above-named. Once, in a case where mercurial powders, by a mistake between nurse and doctor, were given to a child suffering from a slight febrile disorder, I saw the whole of the deciduous teeth made to slough away in a deluge of purulent fluid, and, as a further evil, a permanent set of teeth

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developed, all of which were of dark colour, brittle, pitted, and very soon carious.

Thus we see that alveolar abscess has an extended range of causes. I might enlarge on this point, indeed, vastly. But the leading facts being supplied, the rest must for this time remain.

The last variety of purulent disorder in and about the teeth, is that form of ulceration and purulent exudation, known under the very absurd term "cancrum oris." The affection is one mainly confined to children, and some confusion has arisen regarding it, by the fact that the term is too indefinite to be of practical meaning. It were well, indeed, to throw overboard the term cancrum oris altogether, and to speak of the affection now in hand, as suppurative ulceration of the gums and mouth.

I have said this disease occurs in children, and, ordinarily, during the period of the first dentition. I have told also, in a previous lecture, that the disease occurs only in the children of the poor, and in children badly sustained by the essentials to existence, food and air. I do not think there is any necessity to divide the purulent ulceration of the gums and mouth into two classes, as Mr Tomes suggests, viz., into ulceration as affecting the gums, and ulceration as affecting the other parts of the oral cavity. In Dispensary practice, I have had great opportunities of observing this disease, and my belief is, that as regards the kind of ulceration, as regards the exudation, and as regards general symptoms, there is only one disease, and that the position of the ulceration whether on the gum structure or on the inner surface of the cheek, is the merest accident.

In its course the disease does not commonly present itself until some of the deciduous teeth are through; nor does it commonly present itself after the appearance of the temporary teeth. The affection is always preceded by general symptoms. The child is fretful, has griping pain in the bowels, has diarrhœa, has a burning pungently hot skin, great redness of the lips, gums, and tongue, and intense thirst. The saliva secreted at this time is strongly acid, and the excreta from the bowels are also acid. The attendants of the child are, moreover, conscious of an unbearable sour odour as arising from the body of the child. After a little time the true local symptoms appear. The parts of the mouth covered with mucous membrane swell and easily bleed. The lips often swell to double their size. A child brought before me yesterday presented this symptom in a severe degree; the upper lip was everted by the tension and cracked in bleeding fissures. The swollen condition having lasted for a period varying from two days to five or six the surface disintegrates at some point and the ulceration commences. A common point of ulceration is in the lower part of the buccal cavity, especially in parts where salival secretion can accumulate, as, for instance, at the point of junction between the lip and gum. The ulceration is indeed excited, as I think, by the presence of

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a diseased salival excretion. Once started, it extends readily, breaking out in several patches, and leading to the exudation of free and offensive thin purulent matter, which, together with the saliva intermixed with it, fills the mouth at times with fluid, and excites appearances not unlike those produced by mercury carried to salivation.

The termination of the disease may be fatal under the best treatment, for the little sufferer is subjected to a triplet of misfortunes. The ulceration and discharge feeds on itself. Excited primarily by a degraded state of the blood, it progresses the more rapidly, as the nutritive process is the further degraded. There is added, too, the wear and tear of pain, and there is added, also, the difficulty of feeding. Thus, surrounded by all these evils, the disease is most difficult to meet, and in recovery, there is a slowness which calls for an extraordinary exhibition of patience.

In extreme cases the gum is entirely removed, and alveolar exfoliation is the consequence. In most cases the deciduous teeth are rendered carious, and the temporary set are sometimes injured. Dr Harris, quoting from Delabarre, gives instances in which there was softening of the whole maxillæ, and carbunculous destruction of the cheek, hectic, and rapid death. These cases must be extremely rare. The same authority remarks that the disease is most common amongst females, but there are really no reliable data to prove that sex alone has any predisposing tendency.

There is one other form of purulent deposit which, though not manifested in the teeth or gums, depends, nevertheless, on the teeth; and deserves, therefore, an incidental notice.

In strumous children it sometimes happens, that during dentition there is enlargement and suppuration of the cervical glands. In many instances which I have seen of this kind of affection I have been able to trace the irritation to the teeth as the starting point. I have seen cases of this character in which enlargement of gland has followed every attack of dental irritation, and I have seen the glandular enlargement subside as soon as the irritation from the dental organs was relieved.

There are other cases in adults in which something of the same kind may result from the presence of a tooth having diseased fangs. A gentleman once applied to me for a hard swelling immediately under the jaw, and which showed a decided inclination to suppuration. After trying many remedies, I began to suspect that a diseased tooth was the head and front of the offending. The tooth, a first-lower molar, was situated directly over part of swelling. It was a very irritable tooth, and was of little use in mastication.

After much persuasion, my patient consented to have the tooth extracted; there was enlargement of the fangs, and the removal not only gave immediate and obvious relief but pro-

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duced a quick and permanent subsidence of the external tumour.

In speaking of the general effects produced by purulent deposits, I alluded to certain present and after symptoms of a systemic kind as attendant or subsequent phenomena. These were the acute fever, the exhaustion consequent on the exudation of purulent matter, the low typhoid condition produced by decomposing pus, and pyæmia or impregnation of blood with purulent fluid.

In purulent diseases of the gums and their adjacent parts, the preceding and coincident acute febrile state is never absent. In diseases of the antrum, when pus is freely thrown out the subsequent exhaustive fever is often present, and in the purulent ulceration of the mouth, this exhaustive condition is a marked sign. In some cases of extreme kind, poisoning by absorption of an alkaline gas disengaged by the fœtid pus may likewise present itself, and under unfavouring states even pyæmia may be a result. The latter, however, is an uncommon sequence.

But this point must always be remembered in connection with purulent exudation in and around the teeth, as in fact specially marking these affections—that whenever there is fœtid matter in the dental structures, every breath inhaled, every fluid or solid swallowed is charged with diseased products in their fluid or gaseous form. In the mildest varieties of purulent disease in the mouth this result has weight; the poisonous inhalation tells speedily upon the general health; the body becomes anæmic; the stomach becomes deranged; the spirits flag; and, as the drop of water by persistence of repetition wears away the stone, so the slightly diseased tooth, acting as the source of a steadily produced poison, slow and insidiously sets up in the system a train of disorders, which render health an impossibility and life a burden.

In cases of extensive purulent formation, as in the purulent ulceration of children, the evil here indicated is intensified twenty fold. I have often wondered in cases where the health was intolerable from the cause named, by what conservation of nature death direct from volatile putrid poison was averted.

In the treatment of the purulent affections now considered certain general principles, well impressed on the mind, serve the practitioner better than the most refined arguments in detail. If the principles are known, the details follow. Let me, then, shadow forth those general rules which modern knowledge, as to symptom and cause, supplies, both by inference and experience. In the acute stages of a disorder in which the formation of purulent matter is dreaded, the first principle then is to look for, and if possible remove, the local irritant. If a gum is under distention, let it be divided; if a diseased tooth is the irritant, let it be removed. If removal of the irritant is impossible, the next best means is to soothe the local suffering, by exclusion of air and the use of anodyne applications, as opiate stopping or opiate fomentation. You will find most writers recommending blood-

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letting by leeches as the remedy. You will find in that practice but little satisfaction. Dr Arnott, in cases of acute inflammation, from which the suppuration in acute cases originates, would recommend extreme cold—congelation—as the local remedy. It is undeniable that extreme cold is the best local narcotic known, and could it be applied readily cold would be the most powerful local remedy in the hands of the practitioner; but, inasmuch as it is not easily applied, it fails in half its value as an every-day resource.

In these acute stages of disease, the systemic treatment must also be remembered, and such remedies may be used as tend without producing extreme depression, to reduce vascular action, and, most of all, to remove pain. For these two indications, antimony and opium are the grand remedies. In acute inflammation of the dental pulp, in inflammation of the lining of the antrum, in inflammation of the periosteal membrane, it is marvellous to see the effect of a quarter grain of tartarized antimony and a full grain of opium powder. You shall search the Pharmacopœia till Doomsday, and you shall find no better remedy for the symptoms I have described.

2. When pus has once formed, it is a principle to try no longer to stop its development, but if it is exciting great pressure to set it free by operation, and to support the system to the eliminating work that is before it. You nourish your patient judiciously well now. You nourish him with animal food; a little wine. You give him fresh air in all the abundance in which it can be procured. If you give him remedies, you prescribe those which shall correct secretion and sustain—the grain dose of quinine, or the ounce of bark decoction; the five or ten minims of dilute mineral acid; or scruple dose of the carbonate of iron. And do not be afraid, either, to begin your supporting plan too soon. There is a mania against supporting remedies out in the world. Let the mania have its swing unheeded. Hecatombs of sick have died under and from depressants; there was never sick man yet who died from the judicious application of natural supportive measures.

I have said that the first local measure required in these purulent diseases is to give free exit to the purulent exudation. True, and if recovery responds to this, enough has been done. But if the purulent exudation remain, and is clearly kept by a foreign body, as by a necrosed tooth, or portion of necrosed alveolus, clear it is that this foreign body should be removed.

3. About washes and lotions in cases of purulent exudation. If the secretion of pus be very free; if the pus is confined in any cavity as the antrum, but not so confined but that it can be mechanically washed out, it is proper in both these cases to remove it by washing, for which purpose simple warm water as a wash is the golden lotion. Should a granulating surface from which pus exudes be slow to repair, it may be stimulated by applying to

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it a water wash containing one or two grains to the ounce of the sulphate of zinc. Or should a granulating surface put forth an excrescence, such excrescence may be destroyed by caustic. Or should a spongy structure, as the gum, remain soft and vascular, some very simple astringent water (there is nothing better than alum water) may be applied with advantage.

But to invent remedies farther removed from common-sense requirement and simplicity than these simple ones—to mix a crucible of messes together, and like our dog doctor rascal (from whom may the very dogs be preserved!) say, "Here is a lotion of specific power; come, buy: — come, buy;" — this is specific quackery, be its guise and representation what it may.

Lastly, in those purulent affections which seem to have a pure constitutional origin, such, for instance, as the purulent ulceration, or cancrum oris, the treatment from first to last is primarily systemic. Locally, all that can be achieved is to remove foreign bodies in the ulcerated part and to keep the mouth clean by simple water washing.

Medicinally, in these cases much may be done. A gentle aperient is always good; and two remedies at hand appear to exert a special beneficent action. These two remedies are the chlorate of potassa, and the carbonate of iron. The first may be given in doses varying from five to ten grains three times daily; the second, in the form of syrup, in from ten to twenty grains three times daily. The smallest of these doses may be given to infants of a year old, and either remedy finds a good menstrum in common water.

Hygienically, the treatment will turn on the air respired: this must be free and pure. Next, this treatment must turn on diet. It will be found that the majority of children who suffer from this affection have been kept on starchy foods—on bread, on rice, on gruel, or the immortal tops and bottoms. These must be removed, and simple milk diet substituted. You need think of no other food for these sufferers, if you can secure for them good milk, and plenty of it; the egg and the flesh, the oil and the wine, are all concentrated in this one fluid—this food provided and even ready prepared by the Divine Father.

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MONTHLY MEETING, TUESDAY, MAY 3RD.

JAMES HARLEY, ESQ., IN THE CHAIR.

Mr Mather, gas engineer, exhibited a self-sustaining gas blowpipe apparatus, invented by himself, for soldering. It consisted of a boiler containing water, which was converted into steam by a small gas burner underneath. The steam (which is the blowing power) was conducted by a pipe through the burner just named, thereby becoming superheated, and passed on to another burner, where it acted as a blowpipe jet with a powerful effect in projecting a flame upon anything requiring soldering. By regulating the quantity of gas burning under the boiler, either a strong deflagrating flame, or a fine pointed one, was obtained, as desired. This apparatus leaves the hands of the workman perfectly free to operate in any way he pleases, and is so portable that every workman in a shop could have one for his use. It only requires the water to be replenished once in an hour, and it is so arranged that hot water is always ready for it. The cost of it is less than half that of any bellows arrangement for the same purposes, being merely 25s. Its powers were exhibited by some articles being soldered with silver in a very clean and rapid manner, and quite to the satisfaction of the chairman and gentlemen present.

The Chairman said that the invention displayed much ingenuity on the part of Mr Mather. He was sure the members present appreciated Mr Mather's kindness in bringing it forward this evening, and in their name he begged to thank him for having done so.

Mr Rymer said it had just come to his knowledge that a large number of members were under the impression that the ordinary meetings of the College would be immediately discontinued, in consequence of the resolutions passed at the last Special General Meeting. This was a misapprehension. The meetings announced for the Session would of necessity be held, and these would not terminate until after the Meeting of Members on the first Tuesday in June. Mr Rymer proceeded to place the meeting in possession of very interesting information with regard to the exertions of several gentlemen during many months past towards forming a School of Dental Science, wherein a thorough practical knowledge of Dental Surgery and Mechanics in all their branches would be taught. The School was, however, entirely independent of the College of Dentists, but the instruction to be afforded would include the requirements of the Body of Examiners of

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the College as well as those of any other Examining Board in this country or elsewhere. A Committee of noblemen and gentlemen were also about to make arrangements for opening an Infirmary for Diseases of the Teeth, and he believed they would so co-operate with the Faculty of the Metropolitan School of Dental Science, as to secure mutual advantages.

Mr Humby then read a paper on TAKING IMPRESSIONS OF THE MOUTH, of which the following is a summary:—A CORRECT IMPRESSION of the mouth is essential to success in the adaptation of artificial teeth. Many materials have been, and are still, used in taking impressions. The most common is pure bee's-wax. This is spoken of in a work published so far back as 1757 (more than a hundred years ago) by a Monsieur Bourdeau. But plaster of Paris, a mixture of bee's-wax and rosin, gutta percha, and other substances find their advocates respectively amongst dental practitioners. I believe one and all to be objectionable. There is, however, a material which I have found answer the purpose in every particular, namely, the plastic compound introduced by Mr Stent, of Coventry street. With this composition I have never found any difficulty in obtaining an impression, even in the most unpromising case. I do not mean to say that I have always been successful with the model trays in general use, as there are cases where I have been unable to get an impression with them, but I have overcome the obstacle by means of a small invention of my own, which I will explain to you. The invention consists in adapting a tray so as to render it capable of being rendered broader or narrower at pleasure. The advantages are these: In a case where the alveolar ridge is broad and the mouth small, the plastic compound may be introduced into the mouth most conveniently, the tray being partially closed, and when in the mouth expanded to the required breadth. The front part of the tray is movable by means of a screw, so that in cases where remaining teeth project unduly, room may be made for them. The composition can be pressed into the palate by turning the thumbscrew attached to the handle. Lastly, three sizes only of the tray are required by the practitioner, as each can easily be enlarged or diminished.

Mr Humby exhibited then several difficult impressions he had taken with the improved tray and Stent's compound, including one of a very remarkable case of cleft palate, and concluded by thanking the members for the attention with which they had received his observations.

The Chairman remarked that the tray alluded to by Mr Humby had been illustrated and explained in the 'DENTAL REVIEW;' nevertheless he felt indebted to Mr Humby for exhibiting to the meeting

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the invention itself. He was, however, of opinion that cases were extremely rare where correct impressions could not be taken with ordinary trays and pure wax.

Mr Finzi considered that Mr Humby had exercised considerable ingenuity in the adaptation of his model tray.

Mr Rymer thought that pure wax was preferable to every other substance in taking impressions, and as he was generally sufficiently successful with it, he doubted whether he should employ any other material unless superiority was clearly proved. He had tried a composition very similar in appearance to that placed in his hand by Mr Humby, but he found that it required a high temperature to soften it, and that it was necessary to obtain the impression whilst the composition retained such great heat that few patients could endure it. In one case, of an old sea captain, he remembered its employment had been followed by exclamations condemnatory of the unpleasant sensation caused by the heat, in strong terms which he would not then repeat.

Mr Humby said that the composition alluded to by Mr Rymer was quite different to Mr Stent's; in proof of this Mr Humby softened some of the latter in presence of the meeting, and Mr Rymer acknowledged that the materials were not the same, as the objectionable heat spoken of by the latter gentleman was manifestly not present in the compound exhibited by Mr Humby, although it was rendered sufficiently soft to take any impression.

After some further remarks from Mr W. Perkins, Mr Hockley, and others, the Chairman proposed a vote of thanks to Mr Humby for the paper he had read, which was carried unanimously, and the meeting adjourned to Tuesday, June 6th.

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LECTURE VIII.

[*Delivered on January* 18, 1859.]

THE HISTORY OF MALIGNANT DISEASES INVOLVING THE ORGANS OF MASTICATION.

Mr President and Gentlemen,

In the diseases affecting the organs of mastication which have up to the present time passed before us, we have met with none as yet which can be designated as inevitably fatal, despite the full resources of our science. To-night it is our task to consider a class of disorders on which death fattens, and before which the ablest science languishes helplessly. A sad task this, then, yet one which on account of its weight is the more enthralling.

The disease is, and is fatal, by and from our ignorance. We are striving hard to remedy that ignorance, and we must strive more. The labours of the medical body during the last twenty years have indeed been very remarkable in regard to malignant diseases and their causes. Much has been determined as to the character of a malignant growth, and if nothing affirmative has been discovered as to the cause, much even in this direction has been learnt of a negative value. We have learnt, *i.e.*, what are *not* causes. As I would do my best to set you all thinking deeply on the subject to be brought forward to-night, I shall not hesitate to place briefly before you the principal facts which have been brought to light by the labours to which I have referred.

By the term malignant diseases is conveyed in one general expression the diseases known commonly as cancerous diseases. They are not a wide group, indeed it is in a strict sense incorrect to speak of them in the plural number. There is, in a word, but one disease. The external form in which the disease manifests itself may vary, and upon such local variation we have a reason for certain names, after the same fashion as that by which we designate this man a negro, and that man an albino.

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But the disease is essentially one throughout, having the same general cause, symptom, course, and termination.

The essential nature of the disorder, in so far as it is presented to us, consists in the establishment in some part of the body of a series of new processes, consisting: First, in the formation, in the part affected, of a product foreign to the part; secondly, in the destruction of the normal structure of the part; thirdly, in the steady elimination from the part of a fluid or semi-fluid substance, derived from the blood; and fourthly, in the exhaustion of the system to its death from the constant loss to which it is subjected.

There is in regard to the body, as in regard to many other systems less complicate and better understood, one great law easily explained—the law, I mean, of supply and demand, or of supply *versus* demand. In the body the supply must equal demand; the wasting tissue must be proportionately made up. Let this law be broken by ever so little, let the waste by ever so little be always greater than the nourishment, and the result is in the end inevitable. Time may be required for a marked change to be developed; but time is certain, and so is the result in the time, sooner or later the disproportion between the waste and the supply is felt, then the whole system fails, then the end must come.

Attach no superstitious notion or mythical idea to cancerous growths. They kill by virtue of their interference with a simple physical law. Banks break by interference with the same law, and nations fail. If in the grand universe the same law were broken, all organic life would fail, and mother earth would be childless. The cancerous growth is not peculiar to any one structure of the body. It may be developed in gland, it may occur on mucous or cutaneous surface, it may occur in bone; and the three positions here noted are those in which it is most frequent. Nor is it peculiar to one special age, though it is most so after the age of thirty, and goes on after this increasing till old age; it has been known, however, to affect the infant before its birth. In the 'Medical Times,' vol. xxi, p. 368, for the year 1850, there is the report of a case by Mr Griffiths, in which a child, whose parents were apparently free from cancerous disease, was born with a tumour presenting near the left eye. The tumour, soft and pendulous, was of the size of a hen's egg, it involved the eye, and externally was highly vascular. The tumour grew rapidly after birth, the skin ulcerated, there was discharge of fœtid pus and of blood. The glands of the neck enlarged, and several bad swellings formed on different parts of the body. The infant died in convulsions at the end of four weeks, and the tumour, which is retained in the museum of King's College, showed all the ordinary characteristics of malignant disease. It weighed seven ounces and six drachms. The

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brain and lungs were healthy, but the liver and left kidney contained malignant deposit.

A similar case is given in the 'Journal des Progrés,' tome xiv, by M. Tormele. The parents in this instance were free from cancerous disease, but the father was an old man, over eighty years of age. The cancerous tumour, which was of the kind known as fungus hæmatodes, was attached to the right parietal bone of the skull; it involved the osseous tissue, and perforated, but did not affect, the dura mater or membrane lining the cranial cavity. The child was born dead, and the brain was found soft and infiltrated with blood.

It has been observed too, by most writers, that age stamps in some measure the character of the cancer mass. Thus hard cancer is most frequent in old persons, soft and bleeding cancer in the younger. But there are exceptions to this rule.

The disease is ordinarily more common amongst women than men; this remark applies rather to cancerous formations altogether than to particular forms of cancer. In relation to some special varieties of malignant growth, the prevalence might, I believe, be traced to the male side of creation.

The disease seems to pervade all classes of living animals. It is common to dogs, it is common to many of those domesticated animals which we take as food; it even occurs in fishes. Dr Edwards Crisp once caught an enormous pot-bellied pike. He found the great size was due to a large fungous growth.

The characters of malignant tumours have been examined both chemically and microscopically, and subject to certain modifications resulting from position and stage of disease; the physical characters are pretty well understood. The tumour generally presents a fibrous basis, which is infiltrated with cells, nuclei, and cancer juice. There has been recently great discussion in the scientific world on the point whether or not there is any specific cancer cell. It was assumed some years ago that a peculiar cell called "candate" was diagnostic of a cancer growth. This view, after much discussion, has been set aside. Dr Henry, in a very able paper on this point, says:—"That he should rather be guided by finding cells in situations where they ought not to be, than by finding any special cell. But if there is one cell more diagnostic of cancer than another, it is a large parent cell, with from three to five smaller ones in it." The cancer fluid is a creamy fluid which pervades the whole structure, from which it may be squeezed out by pressure, and contains the cells of which I have spoken.

These parts, consisting of the cancer cells, nuclei, and juice, give the softness to the cancer's growth, while the fibrous tissue or struma constitutes the basis or skeleton work of the tumour. Hardness or softness of cancer thus depends in great part upon

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the relations in the tumour held by the fibrous basis and the infiltrated fluids.

The whole of these parts, again, are originally derived from an albuminous yellow fluid, which, eliminated direct from the blood, permeates all the tissues of the part, and yields the materials out of which the after structure is supplied and built up.

According to the general characteristics of the malignant growth, names are applied to it, mapping out the disease into its so called varieties. Thus in some examples the growth is hard, and the tumour is known by the term, schirrus, or hard cancer, the cancer most commonly affecting the heart and osteoid. In other cases the tumour is soft and spongy, or cheese-like, or very vascular, and to this variety the term medullary or soft cancer is applied. In a third class the cancerous product presents a surface of an ulcerative type, or, I had rather said, of a vegetative type, and such cancer is called epithetical, or villous. In the fourth set the tumour exists as a gelatinous mass, and is known as the colloid form of malignant disease.

This, however, may be stated, in reference to all these varieties, that they all have a common nature, and that they are susceptible of transformation, the one into the other. In all, a process of elimination or excretion is always present; in all, the tumour is highly vascular; in many instances the character of the tumour is simply modified by the infiltration into it of some matter or colouring principle derived from the blood. Thus, there is a class of cancer known as the dark or melanotic cancer, which derives its dark peculiarity simply from the circumstance that the tumour is infiltrated with a dark pigmentary substance derived from its vascular supply.

I have said that the structure of the cancerous growth has been studied chemically, but I regret to add that chemistry has as yet thrown but little light on the disorder. L'Heretier made three analyses of schirrus, and found many of the blood constituents, as water, albumen, fibrine, gelatin, fat, phosphorised fat, peroxide of iron, yellow pigment, and salts. Other analyses are certainly required, conducted on a new and a more determinate principle, but for these we must bide our time.

The local characters of a malignant growth then are, in short, the development of a new growth, attended by infiltration of fluid matter derived from the blood: a tendency on the part of this growth to ulcerate; and a tendency to continue giving out a fluid without any approach towards reparation.

In addition, there are some other local signs, very marked in character. One of these is *pain*. The pain arising from cancer varies according to the character and varies as to cause. In schirrus, or hard cancer, the pain from the first is excruciating. A deep, frequent, lanceolating pain, which no sedative relieves, and which occasionally takes place in paroxysmal periods. In other

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cases the pain, less intense, is dull and heavy. When the pain is lanceolating, it is due usually to interference with the nerves by which the part affected is supplied. When it is dull and diffuse, it is due, at least in part, to pressure and to encroachment by the diseased mass on neighbouring structures.

There is, further, one general sign which is always considered as indicative of the existence of cancerous disease. This is called the cancerous cachexia. Its signs are, a prostration of energy; often an unusual irritability of mind; a striking dusky yellowness of skin; these symptoms go on increasing until in wasting and pain the end arrives.

There are different views as to the position of this general sign in relation to the local manifestation. Common observation places it as preceding the local disease. Common observation leads to the opinion that the cachectic state of the cancerous patient is the outward and visible sign of a general systemic derangement, upon which the cancer growth is engrafted. But it is fair to say that in some instances the cancerous cachexy is secondary in its appearance to the local disease, and that a few authorities of weight are inclined to consider the cachexy as the representation of the local disease; in the same manner as the exhaustion, the sweating, and the emaciation of consumption are the sequences of the local pulmonary affection.

To return to the local malignant disease; a various number of theories have existed at various times and amongst different men as to the nature of the affection.

Adams, Bacon, and Carmichael held a view that the disease was of hydatid growth. That is to say, in simplest terms, that the growth was a low form of organization, in which true and independent organized animals of the entozoa kind were produced. Modern microscopical science has done nothing but negative this hypothesis; there is, in a word, no ground for retaining it longer except as a curiosity in literature.

Broussais, Wenzel, Breschet, and many more, have assigned the malignant growth to an inflammatory source. In the part affected there is originally, argue these, inflammatory mischief, and the local changes are the upshot of this inflammation. It can only be said in reference to this once widely extended view, that in accordance with our modern and more definite knowledge as to the nature of the inflammatory process, there are no points of analogy offered between simple inflammation and its results, and the formation of a cancerous mass and its consequences.

A third theory has been offered which in plain terms suggests that the cancer matter is derived from the blood. The affected part is infiltrated with a diseased plasma, which has a tendency to new or vegetative growth. This view at all events supplies a reason for the constant supply of the disease and for the exhaustion which succeeds. But it is not consonant with all the

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facts; for as yet no definite diseased condition of any part of the blood has been discovered either by the microscope or by chemical investigation.

A fourth theory may be called the glandular theory of the disease. This assumes that the diseased part takes on glandular functions; that it secretes from the blood supplied to it the malignant material; that the cancer mass is in reality an excreting organ; and that it removes from the body at large the cancer poison.

A last view which has been maintained is, that the blood is healthy and that the disease is purely local. That on the part affected, and not elsewhere, the plasma of the blood supplied to the part is subject to special transformation into the new and destructive tissue. Against this hypothesis must be urged the recurrence of cancer after extirpation, and the fact that cancer arrested in one part of the body will often appear forthwith in another.

Taking all the facts together, the sum and substance of cause seems to be this—that there is in the cancerous subject a specific poison which fixes on certain particular organs for the development of its effects, and which is derived from, or at least caused by, the blood.

This view is supported by many proofs. I will sketch out a few of these.

1. There seems to be no doubt on the point that the cancerous diathesis is hereditary in its nature. It passes from parent to offspring. This indicates that the disease has for its base a general predisposing condition of body.
2. When the disease has once been developed it continues. If it be removed from one structure it breaks out in another. You remove a schirrus breast in an early stage, and in so far effect a temporary cure. Time passes, and by and by the other breast is similarly affected. You remove this, and then some other part takes on the morbid action. There could scarcely be adduced a more logical proof of a general systemic origin of the local lesion.
3. If the diseased product were simply of local origin, the inference is that the disease might be propagated by the mere act of introducing into healthy animals portions of the diseased mass. Many experiments based on this supposition have been tried and failed. Alibert even inoculated himself with cancerous matter and suffered nothing. Dogs have been fed on cancerous matter and have suffered nothing; various other animals have been inoculated with cancer matter and have suffered nothing; and as Dr Aitken aptly observes, "neither has the disease been known at any time to result from accidents incident to the examination either of the living or dead person."

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Yet, in regard to this last-named question of propagation by inoculation, I would remark on certain sources of fallacy which may have crept into the argument. I think that sufficient attention in the performance of these experiments has not been paid to the following circumstances: To the selection of animal operated on, and to the selection of part in which to perform the operation. It is clear that cancer matter selects special points for its effects. Therefore it would be right to select in the animal the same part of the animal as that from which the cancer matter was removed in the affected animal.

It would also be right to use animals of the same kind in the performance of these experiments, *i. e.*, if dogs are used to select a dog suffering from cancer as the subject from which to remove the cancer matter, and to inoculate another and healthy dog, and not any other animal.*

The corrections in the way of experiment are the more required because there now and then occur cases in the human subject in which contagion appears as if it had been a cause; at least there are some very singular coincidences of this kind. Thus, I have myself recorded a case, in which a man who suffered from epithelial cancer of the urethra, appeared to communicate the disease to his wife: both having the disease and both dying from it, the woman having it last and living the longest.

I have enumerated already in these descriptive generalizations many of the symptoms of cancerous disease; the pain, for instance, and the general cachexia. But there are one or two more observations relating to the course of the symptoms and their origin, which must be considered in an attempt, however brief, at systematically teaching the phenomena of this malignant disorder.

It may be remarked, then, that the disease at its onset is often excited by causes of the most trivial character. I have known in the female simple uneven pressure of the stays excite the mischief in the breast. A blow will often prove an irritant in the like manner. But the local evil, though thus excited, will sometimes long linger in the early stages. A hard swelling is produced, or a soft thickening is produced, and that is all that can be said; the patient is perhaps alarmed and consults his or her medical man, but the medical man, though his suspicions may be aroused, cannot in every case, nor perhaps in the majority of cases, be expected to affirm positively that the disease is of malignant growth.

In time, if malignancy is the fact, the tumour becomes painful, and increases in size; and with that pain there is usually associated the first indications of the cachexia of which I have spoken. The face is wan and careworn, the skin of yellow or bronzed cast, the muscular outline is softened down, and the mind is full of forebodings of bad days to come. A kind of hypochondriasis is one of the great signs of this disorder, and this depressed

* Since the above was written I find that the precaution here specified has been provided for in some experiment conducted by Mr L. Lawrence in conjunction with Dr Harley. The results were equally negative.

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mental condition is not due to the patient's knowledge as to the fatality of cancer, but to some condition peculiar to the system, and to the nourishment of the mind's organ—the brain. The hypochondriasis may occur in fact, although the patient may be ignorant of the circumstance that the cancer growth has hold of him. The course which the cancer growth takes varies considerably according to the nature of the tumour; but this is the ordinary fact, that the cancer fluid infiltrated into parts and organs under the skin or under the mucous membrane, goes on increasing until ulceration is the result. The surface covering in the original tumour gives way, that is to say, and the cancer structure is exposed. If the cancer belong to the hard variety—*schirrus*,—a long process of ulceration is to be expected, and if the mass be in the neighbourhood of lymphatic glands, these become involved from the disease taking its course in the line of the lymphatic vessels. If the mass is of the soft variety of cancer,—*medullary*,—it projects as a vegetative substance, sometimes encysted; it easily bleeds, it yields a constant discharge, it sloughs, and is commonly of very rapid growth. If it is of the *epithelial* variety, the ulceration, which may start from the smallest point, as from a wart or mere nodule, extends circumferentially over a wide surface, from this surface there is a continuous discharge of an ichorous fluid; the margin of the ulcer is everted and modulated, and over the surface are nodulated growths. After the cancer mass has softened a white dense liquid can be obtained from parts of it by firm pressure, a sign which is strikingly characteristic. This form of cancer partakes in many respects of the forms of both hard and soft cancer. But it is less painful than schirrus, less rapid in its development than the soft cancer, and, as a general rule, less speedily fatal than either.

But in any case, as the local disorder progresses the general disorder or cachexia increases. The appetite becomes capricious, the nights are passed in pained sleeplessness, and death advances and occurs as the final restorer of the diseased body into its place in the organised and living creation.

I have observed already that cancer may attack a variety of structures; it may therefore as a necessity attack various organs, since organs are but compounds of structures. Hence cancer growths have a wide range; they occur in glands, as in the breast or liver; in bone; in the stomach; beneath the skin; beneath the mucous membrane of the mouth; in the nasal cavities; in the serous cavities.

In the practice of dentistry, however, the cancer growth is met with as occurring only in a limited section of the body; viz., in the maxillary bones; in the nasal cavity; and beneath the lining mucous surface of the mouth and lips, and on the tongue.

It will be our task now to trace out with some care the symptoms special to these forms of malignant disease.

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In my last lecture I explained that two kinds of disease of non-malignant character were occasionally seated in the antrum; these were, first, excessive production and accumulation of the mucous secretion of that cavity; the second, accumulation of purulent secretion. There are two other affections which may occur here; the one non-malignant and the other the malignant disease, which is at this moment under our consideration.

Malignant growth occurring in the maxillary cavity may assume two of the varieties of cancer which I have already described: viz., the hard cancer—schirrus,—and the soft; or—medullary—cancer. As, however, the new growth is, in either case, covered in by bone, the diagnosis is exceedingly difficult as between the one form and the other, and indeed difficult at first even in reference to the fact of non-malignant or malignant disease. The record of a few excellently narrated cases, one by Mr Ferrall, and one by Mr Lyon of Glasgow, and one or two other observers, afford me the best means at command for epitomizing the leading diagnostic facts. Malignant disease of the antrum, ordinarily, does not occur before the middle period of life; the first symptoms are often referred to the teeth; there are frequent attacks of acute odontalgia accompanied with pain and throbbing in the cheek. These attacks, continued for a few weeks, are followed by swelling of the cheek, and it may be by an occasional discharge of blood from the nose. The symptoms, not uncommonly, are quite disregarded until such time as the face becomes distorted by the swelling, and the pain from tension becomes unintermitting. In time the tumour occupies the greater part of the region of the maxillary bone on the side affected, and if the swelling be permitted to progress the eye becomes encroached on by the increasing mass, the distance between the inner angle of the eye and the nose is materially widened, and at this point the tumour beneath throws up a rounded projection. The canine fossa is also filled up, and the alæ of the nose is drawn down and elongated. The nasal organ along the whole of the affected side is flattened so as to seem continuous with the surface of the raised cheek. At this stage the bone beneath having been removed by the pressure at the points least resistant may give way and the tumour may protrude at such points, thus projecting either externally near to the eyeball, laterally into the nasal cavity, or interiorly into the mouth.

There is now free discharge of fœtid matter, particularly from the nasal cavity, or at times there is hæmorrhage; while, enveloping all the symptoms, the body is affected by the well-known cachetic disposition of cachexia. The disease thus manifested, soon runs towards its fatal course, and admits of no ready error of diagnosis. I have sketched out in the above description the schirrus form of disease. In the soft or medullary form of cancer of the antrum there are some points of difference.

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In these cases the disease commences with acute pain of the cheek, extending to the forehead, and is followed by rapid enlargement of the cheek; hæmorrhage from the nostril is often profuse, and a swelling occurs in the nose which may readily be mistaken for polypus. As the swelling progresses pressure upon the eyeball and disfigurement of cheek succeed, and the bony structure quickly gives way at the yielding point. Thus presenting, the tumour is not hard or unyielding as in schirrus, but soft and doughy, sometimes even fluctuating as if from fluid enclosed beneath. The difficulties attending the early diagnosis of these cases is ably summed up by Mr Lyon.

"The absence," he remarks, "of much pain at the commencement, often prevents the patient from applying until the affection has extended beyond the limits of the antrum; while the disease being rare, the surgeon is not afforded the opportunities for its recognizance, and a correct diagnosis is not formed until too late to be useful. A source of frequent error, causing the disease to be neglected, is the elasticity of hæmatoid disease being confounded with fluctuation—a mistake the more likely, that the fungus often shows itself in the usual site of gum abscess, or it protrudes into the nostril, and is taken for, and treated for, polypus, as in the instance I have detailed. It will be apparent that it is only while the morbid growth is confined to the body of the bone, or to the antrum, that there can be any hope from removal of the maxilla—for the neighbouring parts are so irregular in their surfaces, contain so many foramina, and enclose such important organs, that if the disease extends to them, its thorough eradication is impossible. But the growth may extend in all directions, and yet may be still contained within the walls of the antrum. In these instances the whole bone expands, and becomes attenuated by the pressure from within, as it may frequently be seen partially to do in the more favourable cases, anteriorly inside of the cheek, or inferiorly into the mouth, where the thinner expanded shell may be felt crackling under the finger like parchment."

"Another point of difficulty," continues this excellent practical writer, "is the determination of the malignant or benign nature of maxillary tumours. When I reflect upon the many different kinds of hæmatoid disease, and their various appearances at different stages of their progress, I think positive decision as to their nature impracticable, even though assisted by sight and touch, the aids of which we can rarely obtain without first laying open the antrum. And although we may be thus enabled to decide whether the growth be benign or the contrary, as it is always, we believe, attached to the whole surface of the membrane lining the antrum, or its osseous walls, or springs from the body of the bone, we suspect even mild growths soon destroy the osseous parieties by pressure, and become inextricably connected with the adjacent organs and tissues."

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I have pointed out freely the great difficulties in the way of forming a correct diagnosis of malignant disease of the antrum, in order that the pure practitioner in dentistry may be alive to these difficulties, and may not by error in diagnosis, and by ineffective treatment, prevent the patient from soliciting that farther operative skill which belongs to the operating surgeon.

As many of these cases of malignant disease are mistaken for affections of the teeth, the dental practitioner is he who is most likely to be first consulted. The case clear to him as one of tumour in the antrum, it remains for him at once to transfer the case to his brother surgical practitioner; inasmuch as, if operation is to be done, every day lost is a year against the chances of success.

Let me briefly sum up, then, the main diagnostic points in this class of disease.

They are:

1. The appearance of swelling of the cheek, with acute pain.
2. Hæmorrhage from the nose, and indications of fungus growth in the nasal cavity.
3. Extension of swelling to the palate, with crackling sensation on making pressure on the palate bone, or projection of fungous substance in the position of gum abscess.
4. The cancerous cachexia.
5. The age of the patient; the middle age, or a period after the middle age, being the dangerous periods.
6. History of hereditary tendency to malignant growth.

To these general signs two others may be added.

In some instances, as the disease depends on a general producing cause, its local development is not confined to one part. Sometimes there is an accompanying enlargement and painful condition of a lymphatic gland; as, for example, of one of the neck glands. If this be present, the evidence, taken with the preceding signs, is strongly in favour of malignant maxillary disease.

Again, in all cases of doubt, where the evidence negatives the view of malignant disorder, it is always consistent with the soundest rule of practice to remove a tooth from beneath the maxillary cavity, and to puncture the cavity so as to give vent to any contained fluid. If, then, this puncture is made and fluid does not follow; or if, instead of purulent or mucous fluid following, blood flow, the evidence is so far favourable to the hypothesis of cancerous disease, that the case is at least one which comes into the domain of the physician or the surgeon.

Are there any more sources of fallacy in the diagnosis of cancerous growth in the antrum? I think not; at least I think that there are none of serious moment. Two conditions may, nevertheless, be considered. These points are advanced with great force and plainness by Mr Redfern Davies in a history of encephaloid disease of the antrum, recorded in the 'Lancet' for

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January 23, 1858, and reprinted in full in the 'Quarterly Journal of Dental Science.' The conditions which might occur, instead, are exostosis of the maxillary bone, and polypus of the nose extending into the antrum.

Now in any case exostosis of the maxillary bone would be known from malignant disease by a few simple and common-sense indications. The swelling in the first is very slow; secondly, it is very firm; thirdly, it is persistently firm; fourthly, it is not the swelling which would naturally follow pressure exerted within the cavity of a bone and extending in all directions, but it is a projection from one special point, extending by simple increase of itself, and after the manner in which it was first laid down.

With regard to polypus commencing in the nasal cavity, there is this general and very satisfactory indication: that polypus commencing in the nose and extending into the antrum may be distinguished as of polypoid growth from the first, by the simple circumstance that the growth did commence in the nose; for it seems to be the law regarding simple polypoid growth, that it never affects the nose from the antrum, but always affects the antrum from the nose; while true fungous growth in the nose, on the contrary, affects the nose from the antrum, and not the antrum from the nose.

In any case, then, of suspected disease of the antrum, examine always the nose. If in the nasal cavity there be any signs of nasal polypus, and the previous signs have been mainly those of nasal polypus, the enlargement and pain about the antrum having succeeded the nasal symptoms, the evidence then is in favour of disease commencing in the nose, *i.e.*, of nasal polypus extending into the antrum. But if all the symptoms have previously been referred to the antrum, and late in the day there is projection of fungous growth into the nose as from the antrum; if such projection rapidly grow; and if its emergence be attended with hæmorrhage;—the evidence is too clearly in favour of the existence of malignant disease extending from the antrum into the nasal canal.

I have lately had the pleasure of seeing a case in connection with our President, in which polypous growth of the nasal cavity having firm lateral adhesion on the left side, has been for some time accompanied by frequent attacks of toothache, and decided general enlargement of the cheek. The patient has had two teeth extracted for the toothache without relief, because clearly without reason. Were not the patient young, the prognosis would be of difficulty—but as she is twenty-one years of age only; as the general health is good; as there is no evidence of enlargement of lymphatic gland; and as the symptoms appear to have arisen first in the nose, I should diagnose that the case is one of polypus of the nasal cavity, attended either with extension of the polypoid tumour into the antrum, or by closure of

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the canal leading from the antrum to the nasal chamber, and consequent accumulation of fluid in the maxillary sinus.

I saw, however, last summer, a fatal case of cancerous disease, with my friend Dr Barker, of Bedford, which indicates that in early stages great difficulty attends diagnosis, even when polypus is the first sign. The patient in this instance presented himself to Dr Barker with no other symptom save that of a polypus in the nasal cavity. As the tumour progressed rapidly, the patient was subjected to the opinion of several of our leading London surgeons, who all pronounced that there was not more than simple polypus. The growth was attempted to be removed, but it grew the more quickly as the result of the operation. Extending rapidly on all sides, it flattened the nose till that organ was continuous throughout with the cheek; piercing the palate bone, it projected through the mouth, removing the anterior part of the jaw by so-called absorption; and finding in this course least opposition, it continued to extend till deglutition was rendered impossible, and death closed the scene.

In this case the patient was over sixty years of age. The disease, though commencing as polypoid, was malignant; and in this sense the diagnostic points offered above were modified. True, the fungoid growth might here also have commenced in the antrum; but the evidence on this particular fact is, unfortunately, defective.

Malignant disease affecting the bony structure of either upper or lower maxillæ may occur from two sources; independently, *i.e.*, from the bone itself; or secondarily, *i.e.*, by becoming involved in neighbouring cancerous disease, as by disease commencing in the lip or other part of the mouth, and extending to the maxillary structure. In cases of this latter description the diagnosis is easy as regards bone, since the extension of the malignant change is traceable onwards from day to day. But, in the earlier stages of the independent variety of malignant maxillary disorder, there are no specific symptoms, by which malignant tumour can be diagnosed from tumour of mild, or, as the phrase goes, of benign cast. We must glean our knowledge slowly, and by careful and constant observation as to the history of the case, and the course of the symptoms. At the best, we can often only infer, and at the best we can often act only upon inference.

There are nevertheless certain broad outlines which are in some measure valuable, which may guide us right, and certainly will not guide wrong.

Cancerous diseases affecting the maxillary bone may assume two forms, namely, the schirrous or the medullary. When the first form is present, the disease commences as an independent growth; beginning in the cancellous structure and extending into the structure removing parts before it, and opening at last by ulceration. In the second or medullary type, the disease

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may rather be considered as a degeneration of the osseous structure; and its progress is rather that of general enlargement of the bone than the extension of a tumour from the centre circumferentially. The former differs, moreover, in being of slower development, in producing pain more lanceolating in character, in being attended hy enlargement of lymphatic glands, and in giving origin to an enlargement of bone accompanied by great hardness of structure.

Taken together as representatives of one diathetic disorder, they are characterised by the following indications, which, according to intensity, mark them off from simple kinds of osseous disease.

They occur as a general rule about or after the middle age.

They are roused into active development by some exciting cause, such as the presence of a carious tooth, or an injury to the jaw.

They are attended with peculiarly sharp pains, which radiate over a wide surface.

They are characterized, if not at their origin at least early in their progress, by the cancerous cachexia.

They bear with them, in the greater number of instances, the history of hereditary predisposition.

They are relieved by none of the ordinary remedial measures, used with success for the resolution of simple growths.

They are accompanied occasionally by other evidences of cancerous disease, such as hardened gland. This condition is most usual, as we have seen, as the attendant of the schirrus type of the disorder.

Their tendency after their active development is towards extension, either by enclosing natural parts in their growth, or by the removal of normal parts by pressure and destruction of nutrition.

As with malignant growth commencing in the antrum, so, in these examples, the application made by the patient is often in the first instance to the dental practitioner. The primary cause of excitement is a carious or necrosed tooth; the pain felt is referred to such tooth, and removal is required. The surgeon-dentist is the one, therefore, who is constituted first judge as to the existence of malignant disorder. He cannot recognize it too readily, nor apprize his patient of his suspicions with too much circumspect promptitude.

Let me add another important note. It happens not uncommonly that the operation of extraction affords sometimes to the intelligent man an indication of the evil that is at work. It is not necessarily, it is not usually a living tooth which acts as the irritant; it is rather a tooth long dead, with its crown removed, and its body buried in the gum. It is, in short, a tooth which would hardly be expected to ache, concerning which such severe complaint is made. The tooth removed, there exudes from the

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opened cavity a sanious matter, or perhaps blood, and the tooth, or more than one tooth, is removed, but the pain does not subside, and the swelling does not subside. On the contrary, the pain increases, the swelling increases, but the alveolar cavity, left open and never ceasing to throw out sanious fluid, becomes filled with vegetative growth, after which the disease progresses without obscurity.

One of the best marked cases of malignant disease of the lower jaw which I have ever seen commenced in this way, and while the operator for some weeks afterwards, blind to the real nature of the case, was fiddling at the fungous growth with applications of loaf sugar, vitriol, and caustic, the disease was involving the whole osseous framework, and insuring by its advancement the death which succeeded.

I need not go on to describe the extent to which cancerous degeneration will progress when it attacks the bone structure; nor need I describe the result. Suffice it to say, that in displacement of normal structures, in extension of growth, in fatality of result, it follows the same general rules as those given above in regard to cancer of other parts of the body.

Cancer affecting the soft parts of the mouth, such as the lip, the surface of the cheek, or the tongue, assumes in most examples the epithelial variety of the disease. An exception to this may happen with regard to the tongue, the schirrous or hard cancer being occasionally presented in this organ. This exception, however, need not detain us.

The epithelial cancer affecting the parts named commences under the mucous surface in the form of a small induration, or little warty tumour. The age of the patient is important to be noted, for this cancer is rare before forty years. The tumour has commonly a darkish blue appearance, and is hard and painful to the touch. It rarely is developed, even in those predisposed, without the presence of some irritating cause. Thus, in cancer of the lower lip, the common excitant in smokers is the pipe; it is not so much the pressure of the pipe, however, as the heat of the pipe which excites, for it has been observed that the short pipe, or cutty, is that which proves the readiest irritant. Other irritants play the same part. Thus the primary tumour may commence in the mucous lining of the alveolus, covering a portion of necrosed alveolus, or a carious or necrosed tooth; or the tumour may begin in the mucous lining of the cheek, under the irritation of a broken or jagged tooth. I remember a man, apparently in good health, coming to me about two teeth—one a lower bicuspid, the other the last molar—on account of their causing soreness of the cheek by friction. With no suspicion as to the latent evil, I smoothed down the rough edges with the file, and promised speedy relief; but relief did not come, so I had the teeth taken out, and still no relief. Shortly the two points which had been subjected to the irritation became the seats of

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the two nodular masses from whence dated the progression of fatal epithelial disease. I saw cancer of the tongue, also, once proceed from similar irritation.

When the small nodule, then, has remained for some little time, ulceration commences at the centre of the mass. The edges of the ulcer are nodulated, and the diseases spreading rapidly, give rise to constant ichorous discharge, constant and unmitigated pain, and now and then to hæmorrhage. Deep fissures which bleed readily form across the ulcerated surface, firm structures lying beneath or near the ulceration are involved, and from the pain, the discharge, and the inability on the part of the sufferer to receive nourishment, the ultimatum is reached.

Cases again may happen in which the tumour first formed does not immediately ulcerate, but taking its base over some portion of mucous membrane, beneath which lies a carious portion of bone or tooth, increases largely in size, and becomes a pendulous fleshy tumour, which may remain for months very painful and troublesome, but without ulceration. If the disease is really malignant, time is the only element, nevertheless, to ensure ulceration. The ulceration at last commencing on the surface of the tumefied mass, goes on spreading, the parts beneath become involved, and the symptoms take the same course as in the cases previously discussed.

Turn we now to the principles of treatment in cases of malignant disease affecting the organs of mastication. To the practitioner of dentistry, as occurring in his every-day life, these are few and simple; to the practitioner of surgery they are momentous, and of all others most difficult. Let us glance at both positions.

The practitioner of dentistry meeting with doubtful cases of malignant disease has two points to bear in mind:

First. To use such means as science shall supply to him of ascertaining the nature of the disease.

Secondly. To use such means as come within the scope of his art, to relieve symptoms, or to test by operation the cause of symptoms.

Thus, in disease involving the antrum, if there be no indication of polypoid growth in the nasal canal, and if the evidence is doubtful whether the enlargement or pain are due to cancer growth or to accumulation of fluid, it is as much his duty as that of the surgeon to endeavour, if he sees the opportunity, to settle this point by extraction of a molar, and perforation of the maxillary.

In cases of doubtful disease of the maxillary bone, it is equally his care to remove the sources of irritation arising from teeth.

In cases of epithelial cancer, doubtful in character, the same rule obtains. In all these instances there is one rule of practice common to the duties of both professions, to remove exciting causes, and the member of either profession does that best whose hand is most skilled in the work.

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But these simple rules obeyed, the malignant malady proved by the inefficacy of the simpler measures or by the specific symptoms, the rest belongs to the physician or to the surgeon, according as cancer shall be considered a medical or a surgical disease; and now the grand question of treatment turns on one of two points, the general or the local.

The general aims at removing the systemic cause.

The local treatment, however applied, goes to the local eradication of the diseased part.

In the way of local treatment how many plans might not one enumerate. From the seething iron of the old barbarians, to the sulphate of zinc caustic of Dr Fell, you shall find in medical literature every variety of caustic and every shade of resolvent.

In modern days the local war wages between the knife and the caustic. Before the time of Alexander Monro the knife had unlimited sway. Then Monro declaring that out of sixty cases operated on which he observed, only four recovered, and that those operated on died sooner than those who were let alone, blunted the edge of the knife for a long season. In the hands of Sir Everard Home, the prince of physicians, and Sir Astley Cooper, the prince of surgeons, the knife came again into full repute. Lately there has been another change. Some years ago Professor Paget expressed an opinion which endorsed the almost forgotten statement of Monro. Since that time this eminent man has changed, I believe, his views. So opinion fluctuates.

Now, apart from the abstract question of removal and non-removal, this surely is the common-sense view, as between removal by the knife and removal by caustics; that what the caustic can do by removal the knife can do better, cleaner, infinitely quicker, and in the end, banishing even chloroform, with much less pain.

This admitted, the question next turns on the propriety of removal at all. In the confliction of statement it is difficult to answer this question. But this fact seems evident, that if the knife is to be used at all, it is to be used effectively when once taken up, and it is to be taken up as early as diagnosis is complete.

Except I were to trouble you with the details of operations for special cancerous diseases, I could say no more; and this is all I have to say as regards the knife.

But I must not omit to name one novelty in local treatment. My excellent friend Dr James Arnott has of late years suggested the removal of cancerous growths by means of benumbing cold. He would entirely destroy the life of the new growth by the frequent application of freezing mixture; recently he has suggested the additional use of caustics with cold; by which suggestion he hopes that more effectual removal may be obtained without the establishment of any additional pain.

Dr Arnott's plan has not yet been tried with such observation

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from the history of many cases as would warrant the expression of an opinion as to its ultimate value.

But whatever mode of local treatment be employed, this truth must be told of it, that it is palliative at best, and no more. The disease will return. It need not return in the same part, but it will return somewhere. As well attempt to destroy mankind by destroying all the infants as to attempt to destroy cancer by removing its products.

If we are to expect any cure for cancer, we must seek for it in general measures. We must find its cause or its antidote. What number of antidotes have been raised I could not tell in a single lecture. The whole 'Pharmacopœia' fifty times edited has been tested; and yet no remedy save in that narcotic series, of which opium is the great representative, which palliate without cure. Shall we then hopelessly give up the search? Certainly not. I for one believe, though no worshipper of nostrums and symbolicals, that as cancer is a chemical disorder, so there is for it a chemical remedy. That as quinine, by its chemical influence, cures ague, and arsenic lepra, so shall a like remedy be found some day for malignant disease.

Meanwhile, living in hope, this outline of a provisional treatment for cancer must be given. That the cancer-stricken will find his best remedy, not in hospital ward, nor in crowded city, but on the hills, where flowers grow, the sun shines, and the air gives even that lease of life which physic as yet fails to supply.

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MONTHLY MEETING, TUESDAY, JUNE 7th.

PETER MATTHEWS, ESQ., IN THE CHAIR.

REPORT OF COMMITTEE ON ELECTRICITY AS AN ANÆSTHETIC IN DENTAL OPERATIONS.

THE last ordinary Meeting of the Session was held on Tuesday, June 7th, when, in addition to a large attendance of Members, there were present, Drs Richardson, Camps, Kidd, Burrows, Lawrence, Mackenzie, Wyld; Messrs Harry Lobb, Marshall, Betts, Forsyth, Hertslet, &c.

Mr MATTHEWS, on taking the chair, said, that as this was the last ordinary meeting of the Members of the College for this Session, it had been thought a fitting opportunity for the Report of the Committee on Dental Anæsthesia to be presented. It would be remembered that at the public meeting in October, 1858, when there was a very large assembly of the profession generally—who had been invited to attend and express their opinion upon Electricity as an Anæsthetic applied to Dental Surgery— a Committee had been formed, he was happy to say, a very large Committee, consisting of many eminent men, physicians and surgeons, and a great many dental surgeons. That Committee had been very arduous in their exertions and inquiries, and they were prepared to present their Report that evening.

Dr RICHARDSON then read the Report of the Committee, which elicited considerable applause.

REPORT OF COMMITTEE.

IT is the business of the committee appointed by the College of Dentists on the 12th of October, 1858, to bring forward in the report now presented the results of the inquiries instituted by the members of the committee, relative to the value of electricity as an anæsthetic in operations on the teeth.

The points of inquiry specially recommended to the notice of the committee seemed to resolve themselves primarily into the following:—

1. In a strict physiological sense can electricity be applied in such a way as to remove from any part of the body its normal sensibility?
2. Can electricity be so applied with promise of success in the operative department of dentistry?
3. Granting that an affirmative is given to the two preceding questions, what apparatus is to be commended as at once the cheapest, the most compact, and the most manageable for the Dental Practitioner?

Historical Note.—Electricity as an assumed anæsthetic was for the first time brought forward prominently in practice by our American brethren, in the course of the year 1858. In

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commencing its report, the committee must indicate, however, that the question of anæsthetic agency derivable from electricity had been brought forward as a curious scientific problem on many occasions. Thus the application of an electrical current to parts suffering from neuralgiac pain as a means of reducing that pain has been practised for many years, and, according to the observations of various authors, with a considerable measure of success. These observations have been made on the continent and in this country. The subject has likewise been accidentally studied by experiment. As far back as the year 1853, one of ourselves, in performing an experiment on a dog with a Leyden battery, prostrated the animal by a powerful shock, and proceeded, whilst the animal was insensible, to cut down to the external jugular. The vein was disclosed, blood was drawn from it, and sutures were placed in the wound while yet the animal was insensible. After the operation was completed the dog became conscious and recovered. The observation thus made was without intention, and, in so far as the result bore on anæsthesia, was accidental. But the circumstance led the author of the experiment to carry on for some months inquiries as to the reduction of sensation in parts locally by the aid of the electric current and the administration of repeated discharges from the Leyden battery. The end of these experiences was, that the electric current had no anæsthetic virtues when locally applied, and that the electrical discharge could only be considered as effective when so employed as to destroy the consciousness of the animal.

In the way of history the few facts above supplied include all that we can discover towards the attempt of producing anæsthesia by electricity. Until such time as the members of the Dental Profession in America, headed by Dr Francis, recommended and practised the system of employing an intermittent induced current in extraction.

The committee at their earliest sittings met to discuss only the order in which they should proceed in their researches, and to familiarise themselves with the use of the instruments about to be employed. At the fourth meeting resolutions were unanimously carried to the effect :—

That each gentleman who should bring cases for operation should describe the nature of the case and the operation required. That two members of committee should then inspect the case and report their opinions. That in operating with the electrical current as an adjunct, the method of applying the current should be variously modified, the intermittent and

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the continuous currents being both called into requisition. That at the termination of each series of experiments, the report of the result of each case should be read by the honorary secretary, and confirmed by an unanimous vote. At first, also, it was thought best that the operations to be recorded should be witnessed by the full committee. Ultimately sub-committees were established, and reports from them were received.

LIST OF ELECTRICAL APPARATUS USED.

1. The ordinary one, called the intermittent induced apparatus, commonly known as Smee's electro-magnetic machine. This was used with and without the spring foot-board for closing the circuit after the tooth was grasped.
2. The apparatus of MM. Legendre et Morin, for producing the induced intermittent current.
3. A Smee battery of 12 cells for the continuous current.
4. A Pulvermacher chain of from 60 to 120 elements for a continuous current.
5. A Daniel battery for the continuous current.
6. Piggott's electro-magnetic machine for producing the intermittent current.
7. An electro-magnetic machine giving primary and secondary currents, made by Siemens of Berlin.

EXPERIMENTAL OBSERVATIONS.

The committee, before passing to the history of the experiments performed, have to offer one or two prefatory remarks.

The first series of experiments were confined to the intermittent current; the second to the continuous. This arrangement was maintained unbroken, except in one or two instances. The exceptions we made when in the same patient two or more teeth had to be extracted. By changing the character of the experiment on these occasions comparative results were secured and recorded.

In taking their record, the reporters have often intentionally used the actual words applied by the patients as expressive of their sensations in regard to the operation. Elegance of expression has not been invariably secured by this plan, but its adoption has given faithfulness to the narrative, a more important item.

In their own remarks the reporters have frequently used the term, a current of electricity, in speaking of the transmission of the electrical force. In employing this term they have been guided solely by custom; it is not their intention to convey by the term the common idea of an actual current as of a fluid.

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To save the repetition of what would otherwise be a constantly recurring statement, the reporters would observe that in using the intermittent current, the position of the poles of the battery were reversed during each alternate experiment, *i.e.*, if in experiment (A) the positive pole were connected with the tooth and the negative with the hand, in the next experiment the negative pole was connected with the tooth and the positive with the hand, and so on throughout.

Lastly, in all cases the usual care was taken to secure insulation, so that the hand of the operator should not interfere with the circuit.

LIST OF OBSERVATIONS ON OPERATIONS PERFORMED WITH THE INTERMITTENT CURRENT.*

A young woman appeared before the committee, to have three stumps extracted. The stumps were firmly fixed in the jaw. A gentle intermittent current from the electro-magnetic machine was produced, and the force modified until the patient expressed, on taking the poles into her hands, that the sensation produced was easily bearable. One pole was now removed from the hand, and the wire attached to the forceps. The forceps applied to the tooth exerted the same sensation as in the hands. The stump was then extracted.

Result.—The extraction was painful. The patient complained of pain at every step; in the laying hold of the tooth and in the dislocation. The expression of pain at the moment of operating was as marked as in operations where electricity is not used.

OBSERVATION 2.—The second stump was extracted with forceps, a continuous current of electricity from a sixty-link Pulvermacher chain being employed. The pole from the positive end of the chain was in this instance applied beneath the jaw at a point corresponding to the tooth above. The negative pole was attached to the forceps.

Result.—The same as in the extraction of the first stump. Pain equally expressed.

OBSERVATION 3.—The third stump was extracted from the same patient with forceps, the intermittent current being used in the same manner as in Observation 1.

Result.—As in two preceding observations. The patient stated, when all the stumps had been extracted, that the pain in

* Meeting of committee at 5 Cavendish square, on Friday, November the 19th, 1858. Present: Drs Elliotson, Richardson, Lawrence, and Arnott; Messrs Perkins, Matthews, Harry Lobb, Harding, Purland, Weiss, Kempton, E. Williams, and Hockley.

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each was equally severe. She could not herself distinguish any difference.

OBSERVATION 4.—A young man presented himself, requesting that a molar tooth should be extracted. A gentle intermittent current was passed through the arm and tooth, the forceps being the immediately connecting body with the tooth. This patient, before and during the operation, was very pale and faint, a fact to which we would draw special attention, as bearing on points to be considered in the sequel.

Result.—He expressed, after the operation and his recovery from the faintness, that he had experienced no great pain, and that the extraction was much less painful than the toothache. It was clear also from the expression during the extraction that the pain felt was not severe.

OBSERVATION 5.—A gentleman was the subject of this observation. The tooth was a stump, firmly fixed. The key was used for extraction. The intermittent current of electricity was applied, the current being directed from the hand to the tooth through the key, to the staff of which the pole from the battery was attached. The current was made much more powerful on this occasion.

Result.—The pain of extraction was very severe; as marked as in cases of extraction without the current.

OBSERVATION 6.—A young girl, florid and fearless, was the subject of this observation. A molar tooth was required to be extracted. The intermittent current from the hand to the tooth through the forceps was used, and the current was made powerful to the extent of being just bearable.

Result.—The patient described the pain of extraction as most severe, and the expression during operation was such as marked the fact that no mitigation of pain had been secured.

* OBSERVATION 7.—The patient was a girl of healthy aspect. She requested the removal of a lower molar tooth. The induced intermittent current was used, one pole being placed beneath the angle of the jaw, the other to the forceps.

Result.—The extraction was simply described as "not very painful."

OBSERVATION 8.—The patient was a healthy boy. He asked to have removed a molar tooth. The electrical current was applied as in the case immediately preceding.

Result.—The same as in last. The patient described the extraction as "not very painful."

* OBSERVATIONS 7 to 14.—Made at a meeting of committee held on Friday, December the 3rd, 1858. Present: Drs Elliotson, Richardson, and Lawrence; Messrs Matthews, Harry Lobb, Kempton, Williams, Thomson, and Hockley.

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OBSERVATION 9.—The patient was an adult man of pallid appearance. He required three extractions. A canine stump was first operated on. The electrical current was applied exactly as in the case preceding.

Result.—The man expressed having felt pain during the extraction, but not severely.

OBSERVATION 10.—A molar tooth was next extracted from the same person without electricity.

Result.—The pain felt was more severe, according to the patient, than in the extraction of the canine stump with the electrical current.

OBSERVATION 11.—A molar stump was removed from this person. Electricity was again not employed.

Result.—He described the pain as having been much more severe than that produced by the extraction of the canine.

OBSERVATION 12.—The patient was an adult man, of pale cast of countenance. He wished to have a molar tooth extracted. The primary interrupted current of electricity was used, one pole being placed in the hand, the other attached to the forceps.

Result.—The operation was considered by the man to be not very painful.

OBSERVATION 13.—A stump of a bicuspid was extracted for the same patient without the use of electricity.

Result.—The pain was described as infinitely more severe than in the preceding operation.

OBSERVATION 14.—The patient was a healthy man. The tooth to be extracted was a molar. The primary interrupted current was used in precisely the same manner as in Observation 13.

Result.—The evidence of severe pain was most striking; the patient afterwards described it as "awful." Some of the committee inferred that the pain was increased by the electricity.

* OBSERVATION 15.—The patient was a girl. She requested the removal of an upper molar. The induced intermittent current from Smee's electro-magnetic machine was used, the connection being made between the hand and tooth.

Result.—In extracting, the tooth unfortunately broke. The attempt to extract the remaining portion was not allowed. The girl gave vent to expression of great pain.

OBSERVATION 16.—The patient was a girl; the tooth to be

* OBSERVATIONS 15 to 18.—Made at a meeting of the committee held on Friday, December the 10th, 1858. Present: Drs Elliotson, Richardson, and Lawrence; Messrs Matthews, Harry Lobb, Purland, Weiss, Kempton, Thomson, Perkins, Williams, and Hockley.

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extracted a first lower molar. The same electrical apparatus was employed as in the last case, and in the same manner.

Result.—The expression of pain during extraction was subdued; and the girl herself explained that she had experienced a "funny" sensation rather than pain, and that such sensation had been felt in the arm more than in the tooth. As in the case described in Observation 4, this patient was in a partial syncope before and during the operation.

OBSERVATION 17.—The patient was a young man; the tooth to be extracted a lower molar. The same apparatus was employed as in the last case, and in the same manner.

Result.—The pain of extraction was slight; the pain produced by the electric current being most felt. The sensation excited was distributed over the tooth, neck, and arm.

OBSERVATION 18.—The patient was a man, the same person noted as operated on in Observation 14. The second upper molar was the tooth to be extracted. The induced intermittent current was applied, by means of Legendre and Morin's apparatus, the circuit being from the hand to the tooth in the usual way.

Result.—The pain of extraction was comparatively slight, and was described as being less than that caused by the electric shock. The sensation produced by the current was distributed over the tooth, the neck, and the arm.

* OBSERVATION 19.—The patient was a youth, aged fourteen years. The first molar of the upper jaw was the tooth to be extracted; it was carious in its centre, and had given rise to much aching pain. The primary interrupted current was used, the circuit being made between the tooth and jaw. The force of the current was very moderate, sufficient to be little more than pleasant.

Result.—Extraction was described as not having been very painful, but not less painful than in a previous case where it had been performed without electricity. The extraction on the present occasion gave more pain than the electricity.

OBSERVATION 20.—The patient was an adult man. The tooth to be extracted was a first lower molar. The primary interrupted current was again used, the circuit being made between the hand and tooth. The current was made very powerful, so as to be just tolerable.

Result.—The man, who was one of the most intelligent of

* OBSERVATIONS 19 to 22.—Made at a meeting of committee held on Friday, December the 17th, 1858. Present: Drs Elliotson, Richardson, Arnott, and Lawrence; Messrs Matthews, Harry Lobb, Purland, Perkins, Williams, Thomson, Kempton, and Hockley.

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those operated on by the committee, gave very definite information as to the results. He had had five teeth extracted before, without electricity. He said that the electricity was very painful, but that the pain of extraction was less with it than without it. In future he should prefer to have such operation similarly performed.

OBSERVATION 21.—The patient was a youth of fifteen years; the tooth to be extracted was the first lower molar, which was much decayed in the centre. The primary interrupted current was applied as in the last case, and with the same force.

Result.—The pain of the electricity felt so markedly by the previous patient was scarcely felt by the present one. In this case, however, the pain arising from extraction was very severe.

OBSERVATION 22.—The patient was an adult man. The tooth to be extracted was the first upper molar. The tooth was decayed laterally. The primary interrupted current was applied in the same manner as before, but with much more force.

Result.—The man had had teeth extracted before. The electricity was described by him as being very severe to bear, and as being more painful, indeed, than the extraction. The extraction itself was, he believed, less painful than it had been in other cases where no electricity was used.

* OBSERVATION 23.—The patient was an adult man. The tooth to be extracted a first lower molar on the right side. The secondary interrupted current was used, the circuit being established between the hand and the tooth. The key was used as the extracting instrument, one pole from the battery being attached to the staff of the key. A gentle current was used. The operation was instantaneous.

Result.—The patient was conscious rather of a sudden shock than of pain. It was impossible to say how far the current modified the pain.

OBSERVATION 24.—The patient was, again, an adult man. The tooth to be extracted the first lower molar on the right side. The secondary interrupted current was used exactly as in the case last preceding. The key was this time used also as the extracting instrument. The tooth was removed by one rapid movement.

Result.—The pain felt was little, and was much less than in

* OBSERVATIONS 23 to 25.—Made at a meeting of the committee held on Friday, December 31st, 1858.—Present: Drs Elliotson and Richardson; Messrs Matthews, Harry Lobb, Perkins, Weiss, Purland, and Hockley.

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cases of extraction to which the patient had before been subjected without electricity. There were, however, other circumstances which might have modified the pain. The tooth was loose, it was but little covered with gum, and the extraction was more than usually rapid.

OBSERVATION 25.—The patient recorded as operated on in Observation 23 wished, after he had rested, to have a second upper molar tooth extracted. The current was applied exactly as before, but the forceps were used in extraction instead of the key. The operation was much longer in performance than in the previous extraction.

Result. — The expression of pain during the operation was peculiarly acute, and the patient afterwards stated that the suffering was excessive. Still he thought that it was possibly less than in the instances when extraction had been made without the application of the current.

The committee having thus conducted, with all the care and attention at command, twenty-five operations of extraction, in twenty-one of which the intermittent current had been used; in one the continuous, and in three no current, submitted their labours to a sub-committee for analysis, consisting of Dr Lawrence, Mr Matthews, Mr Lobb, and Mr Perkins. On Friday, February 28th, the sub-committee presented an account of the cases, and suggested that the continuous current should be used in further observations. The committee agreed to this course.

EXPERIMENTAL INQUIRIES WITH THE CONTINUOUS CURRENT OF ELECTRICITY.

In the use of the continuous current certain modifications are required in the way of application. In applying the intermittent the object is simply to excite shock at the moment of extraction, for a carefully conducted experiment shows clearly that a prolonged application of the intermittent shock has no more influence in deadening sensibility, under ordinary circumstances, than a brief application.

In using the continuous current the production of shock is not the intention. The shock felt is momentary, *i.e.*, is appreciable only at the closing and opening of the circuit. To institute by the continuous circuit a series of shocks by the act of frequently making contact would have been virtually but to repeat the experiments with the intermittent current. The committee were obliged to spend more time over each of their observations; the inquiry being, not whether shock

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would produce anæsthesia, but whether an uninterrupted current of electricity, passed through a tooth for a given and practicable time, would lead to that result.

The time usually employed by the committee for the continuance of the current was not over fifteen minutes. It was felt that an agency which would not produce its effect, in the general run of cases, within this period, would not, unless it should possess some advantages pre-eminently great, be commendable as of instant and practical service to the operator. The mode of proceeding will be best described in the narratives of observations.

* OBSERVATION 26. — The patient who first presented herself was an adult woman. She desired the extraction of an upper anterior molar tooth. A Daniel battery of forty cells was in play. The positive pole was attached to a conducting handle armed at its extremity with moistened sponge. The sponge was placed above the angle of the jaw, a little in front of the ear, and was there secured. The cavity of the tooth was filled with moist cotton wool, and the exposed tip of the negative pole (all the rest of the wire being insulated with gutta percha) was gently inserted into the cotton wool. The pain produced on making contact was excessive, and could not be borne many minutes. The positive pole was therefore removed from the face until the battery could be reduced to twenty cells. The sponge reapplied, the current was kept up for five minutes, but the pain was great, and faintness threatened. The tooth was consequently liberated from the wire and extracted with forceps, no electrical force being used during extraction.

Result.—The patient showed evident signs of acute pain, and expressed afterwards that the pain of operation was as severe as on a preceding occasion, when a tooth was removed for her without electricity.

OBSERVATION 27.—The patient was an adult man. He requested to have removed a lower molar tooth. The tooth was loose. The Daniel battery as before, but reduced to fifteen cells, was used. The sponge was this time changed to the negative pole, and the negative pole was applied externally over the jaw, at a point corresponding to the tooth, the end positive pole, being placed in the cavity of the tooth, surrounded by a bit of moist cotton wool as before. On closing the circuit the pain excited was severe, and it returned

* OBSERVATIONS 26 to 28. — Made on Friday, February the 18th, 1859. Present: Drs Elliotson, Richardson, and Lawrence; Messrs Matthews, Harry Lobb, Purland, Perkins, Thomson, Kempton, Hockley, Weiss, and Williams.

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at short intervals so acutely, that after the application had continued for three minutes the patient got irritable, and would have no more of it. The connection was therefore broken, and the tooth was extracted.

Result.—The extraction was attended with the ordinary amount of pain.

OBSERVATION 28.—The patient was an adult man. He presented himself to have a first lower molar extracted. The Daniel battery was again used, reduced to ten cells. The positive pole was again applied to the tooth cavity, the negative with moistened sponge behind the angle of the jaw externally. On closing the circuit there, a smart shock and the transition of the current gave pain. At the end of the third minute, syncope being imminent, the poles were removed and the tooth was extracted with the forceps.

Result.—The extraction was attended with the usual demonstration of acute pain.

*OBSERVATION 29.—The patient was a woman. The tooth to be extracted a lower molar. A Pulvermacher chain of 120 links was used on this occasion. The positive pole was placed externally, attached to conductor with moist sponge, behind the ramas of the jaw. The end of the negative pole was attached to the forceps, which were then made gently to grasp the tooth. The current was kept up for fifteen minutes. During the time of the application the woman became drowsy and lapsed into a kind of hysterical faint. At the end of the fifteen minutes the tooth was extracted.

Result. — The woman on recovery expressed herself as unconscious of all that had occurred, and was unaware of any painful impression.

OBSERVATION 30.—The patient was a youth. The tooth was an upper molar. The Pulvermacher chain was used as before, but sixty more links were added. The poles were placed with negative side to the tooth positive externally, in same manner as in last case. The current was sustained again for fifteen minutes. The tooth was extracted.

Result.—The extraction of the tooth was attended with comparatively little suffering, less than had resulted from previously lancing the gum or grip of forceps.

* OBSERVATIONS 29 and 30.—Made on Friday, February the 25th, 1859. Present: Drs Elliotson and Lawrence; Messrs Harry Lobb, Matthews, Purland, Kempton, Weiss, Harding, Perkins, Thomson, Williams, and Hockley.

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* OBSERVATION 31.—The patient was an adult man. He presented himself, requesting the extraction of a lower molar tooth. The continuous current, generated from a Pulvermacher chain of 120 elements, was again used. The negative pole was placed to the tooth, the positive externally. The current was kept up for fifteen minutes. Extraction was then made. The case was a severe one.

Result.—The patient expressed that the pain was not less than in a previous instance, when he had been subjected to a similar operation.

OBSERVATION 32. — The patient was a woman. She requested removal of a molar tooth. The continuous current from the Pulvermacher battery of 120 links was again applied, the position of the poles and the time of application being precisely the same as in last experiment.

Result.—The operation was attended with much pain. In so far as removal of pain was concerned the attempt was unsuccessful.

REPORTS OF THE SUB-COMMITTEES.

From the particulars of the labours of the committee in full, your reporters would now pass to the reports of the sub-committees. The sub-committees are numbered (A), (B), (C).

REPORT OF SUB-COMMITTEE A.

This committee consisted of six members, viz.: Messrs Matthews, Harry Lobb, W. Perkins, H. Kempton, E. Williams, and A. Hockley.

The committee have handed in the following history of their proceedings:

"The sub-committee beg to report that its members have met on repeated occasions at the Westminster General Dispensary, and have performed not less than thirty-one operations of extraction of teeth, the electrical current being used with the intention of reducing the pain.

"In thirty of these operations the induced intermittent current was used, in the way usually recommended, *i. e.*, one pole was placed in the hand of the patient; the other attached to the forceps, the hand of the operator being insulated. The current was also used with varying degrees of force; from a force that was simply pleasant to one that was painfully severe. In one single case the continuous current was used from a Pulvermacher chain of sixty elements.

* OBSERVATIONS 31 and 32.—Made at a meeting of committee held on March the 4th, 1859. Present: Dr Lawrence; Messrs Matthews, Harry Lobb, Purland, Weiss, Kempton, Williams, Perkins, and Hockley.

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"As the results obtained were too uniform to require any detailed history, the sub-committee are content to sum up all they observed in two statements.

"1. That in no instance, under the influence of the electrical current, was there any approach towards the production of local anæsthesia.

"2. That in many instances the pain of extraction did seem to be modified or rather changed in character by the currrent; in some instances this change in the character of the sensations developed, seemed, moreover, to be satisfactory to the patients, as in some measure breaking the acute shock of the operation."

REPORT OF SUB-COMMITTEE B.

This committee, consisting of Messrs Perkins, Williams, and Kempton, state :

"We have had one meeting on Friday, January the 14th, 1859. There were two cases for operation. We used the intermittent current, placing one pole in the hand of the patient and attaching the other pole to the forceps.

"The first case was that of a man aged twenty-three years. The tooth to be extracted was an upper molar. After extraction the patient expressed that the sensation produced by the galvanism was much greater than that produced by the extraction. As compared with previous instances in which the same operation had been performed, the present operation was more bearable.

"In the second case a youth of thirteen was the patient. He desired us to remove a first lower molar. This patient expressed that he did not feel much pain, less, he thought, than on a previous occasion when he had had a tooth withdrawn without the aid of the electrical current.

"The sub-committee have no comments to make on these cases, but the cases may be useful as adding to the list of cases already subjected to operation."

REPORT OF SUB-COMMITTEE C.

This sub-committee consisted of Mr Harry Lobb and Mr Kempton. These gentlemen give the history of two cases in which extraction was performed, after the application of the continuous current. They state :

"The patients operated upon by us were both females. We employed in each case a Pulvermacher battery of 120 elements. We placed the end of the positive conductor connected with a moistened sponge (externally) over the jaw ; the point of the negative conductor was attached to the forceps,

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which were made to grasp the tooth. The current was sustained in each instance for fifteen minutes.

"In neither case was there any evidence of the production of anæsthesia. In one case the pain of extraction was modified; in the other the pain was as severe as it might be expected to be without the current."

SUMMARY.

The committee have thus in their possession the records of sixty-eight cases of tooth extraction, in sixty-five of which the anæsthetic value of electricity was tested, with all the care and the knowledge at the command of the observers. Fifty-five of these operations were performed to test the value of the intermittent current. Ten were performed to test the value of the continuous current. In these experiments every possible modification was introduced. The poles of the batteries were reversed in different cases; the force of the current as indicated by the sensations of the patients was varied; and every necessary precaution was taken to secure insulation of the operator.

The committee, in viewing the whole of the results of the experiments thus performed, find that in much the larger proportion of cases the results were purely negative. In several instances more pain was excited, owing to the application of the current, than if the tooth had been removed at once by simple extraction, in other instances less, while in a few cases, amounting to five altogether, there was evidence of relief. In three instances this evidence was well marked.

The committee does not, however, put forward these latter five named cases as instances of local anæsthesia. It appears to the committee that in all instances where success was apparent, a mental element was called into action, and that the patients at the time of the operation were in a state of partial general insensibility, due probably to hysterical syncope.

In those examples where the patients expressed that the pain was less than they had experienced on previous occasions, the assumed relief did not arise from the fact that the tooth and its neighbouring parts had been rendered dead to external impressions, but from various extraneous causes, of which the committee may enumerate, as most prominent,

1. Diversion of sensation.
2. Less difficulty in extraction as compared with previous extractions.
3. Syncope more or less marked.
4. Differences in the method of operating.

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In those examples where the pain seemed to be increased by the electricity, the cause of the increased pain was obvious. The cases were those in which the tooth was exceedingly sensitive, either from recent inflammation of the pulp, from abscess, or from inflammation of the alveolar periosteum. In many of these cases the patient could only bear the gentlest current, and that with much complaint as to the unnecessary addition of pain.

The committee, as will be observed from the history of the observations, made various changes in the mode of applying the electrical current. These changes had reference to the direction of the current, the poles being generally reversed in each experiment, to the force of the current as defined by the sensations of the patient and to the position of the poles in regard to different parts of the body.

The conclusions at which the committee could only arrive as the summary of their combined observations, are—

(*a*) That the direction of the current does not in any way modify the result.

(*b*) That the force of the current has, equally, but little to do with the issue.

(*c*) That the method of placing the poles, in regard to different parts of the body, did not appear to exercise any peculiar difference. The effect was mainly the same, *i.e.*, when one pole being applied to the tooth, the opposite was applied to the hand, the cheek, the neck, or other region.

As regards the different forms of electrical apparatus and current, the committee are forced to the decision, led solely by their own present inquiries, that the differences in effect are not striking. In nearly the same number of cases, relatively, the intermittent and the continuous currents gave an amount of apparent relief, while in the application of both considerable pain was excited in some particular cases.

The committee feels also, that were it even proven that the electrical current could be so applied as to produce anæsthesia of the soft parts and organs, great difficulties would be in the way in making it useful in dental practice; for the tooth structure being a bad conducting medium, the transmission of the current through it, so as to influence the supplying sensitive nerve, would, in the majority of cases, be impossible.

On a final point the committee is unanimous: that in not one instance did any member observe the merest approach to local anæsthesia. Neither in the tooth, nor in the surrounding structures, nor in the part of the body to which the opposite

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pole was applied, did any indication of insensibility present itself.

The sum and substance of the labours of the committee, in their practical bearing, is this: that the continuous current of electricity is inapplicable as a local anæsthetic in dental operations; that the intermittent current, from being harmless, its use is allowable in practice, by those who may consider it of advantage to produce a diversion of sensation in the patient during extraction; but that as, in a scientific point of view, the electrical force, according to the present knowledge of its application, cannot be accepted as an anæsthetic, the committee could not undertake to recommend any special electrical apparatus, nor any particular method of applying electricity in the operations of dentistry.

The foregoing report, having been read, and discussed in detail by the committee, conveys the unanimous opinion of the members.

JOHN ELLIOTTSON	WILLIAM PERKINS
THOS. H. HARDING	T. PURLAND
A. HOCKLEY	B. W. RICHARDSON
H. T. KEMPTON	SAMUEL L. RYMER
R. M. LAWRENCE	ROBERT THOMSON
HARRY WM. LOBB	FELIX WEISS
PETER MATTHEWS	EDWIN WILLIAMS.

APPENDIX.

ON VOLTAIC NARCOTISM IN OPERATIONS ON THE TEETH.

AT the time when the Committee were on the point of concluding their preceding observations, the fact was brought forward that by the application of the continuous electrical current in combination with certain narcotic substances, local anæsthesia could be produced to such extent as to enable the surgeon to perform several operations without pain. To the process thus invented the name "Voltaic Narcotism" has been applied by its author.

The committee, anxious to ascertain whether the new process could be applied advantageously in dentistry, discussed at a meeting held on February the 5th, the propriety of investigating that point.

It was then moved that experiments should be instituted and added as an appendix to the report.

The resolution was unanimously adopted, and the following observations are the result :—

OBSERVATION 1.—The patient was a youth, aged fourteen.

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The tooth to be extracted was a lower molar. Into the cavity of the tooth was placed a small plug of lint saturated with a solution containing two minims of tincture of aconite and ten of chloroform. To the positive pole of a Smee battery of twelve cells a pointed conductor was attached, the handle of which was insulated. The point of this conductor was now inserted into the lint which had been placed in the cavity of the tooth. The negative pole was attached to a conductor, with insulated handle, armed at its opposite end with a sponge moistened with five minims of aconite and fifteen of chloroform. The sponge was applied externally to the jaw, and the circuit was thus completed. The current was sustained for fifteen minutes. The making of the circuit was painful, and there was excited in the tooth a burning sensation with occasional sensation of shock through the parts enclosed between the poles. These effects ceased after twelve minutes. On the poles being removed the tooth was extracted.

Result.—The patient gave expression to sharp pain at the commencement of the operation, but not afterwards. When the extraction was over, he explained that the grip of the forceps on the tooth was very painful, but that the extraction was but slightly felt.

* OBSERVATION 2.—The patient was a girl, aged fourteen. The tooth to be extracted was a lower left molar. The cavity of the tooth having been cleaned, was filled with a plug of lint saturated with three minims of tincture of aconite and five of chloroform. The Smee battery of twelve cells was used. The point of the negative pole was applied to the cotton in the tooth ; the point of the positive pole, surrounded by a layer of wet lint, was applied over the gum in front of the tooth. No evidence of shock was given in closing the circuit. The current was kept up for fifteen minutes and a half, a drop of chloroform being frequently conveyed to the lint in the tooth, at the end of the time named the poles were removed and the tooth was extracted.

Result.—The patient, though quite sensible, gave no expression of pain. After the operation she stated that although quite aware of all that was done, she was conscious of no pain whatever. All she felt was "the rising of the tooth from the socket."

* OBSERVATION 3. — The patient was a woman. The tooth to be extracted was a lower molar. The cavity of the tooth was filled with a small plug of lint containing three

* Observation made on Friday, April the 1st, 1859. Present: Dr Richardson ; Messrs Harding, Purland, Williams, Thomson, Kempton, and Hockley.

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minims of tincture of aconite and five of chloroform. The Smee battery of eight cells was again used, the negative pole being applied to the tooth, the positive to the under surface of the jaw, externally. The tooth was very sensitive, and the pain caused by the current was too painful to be borne. The wires were therefore removed and extraction performed.

Result.—The ordinary amount of pain was produced; the application not having been continued sufficiently long to cause any diminution of sensibility.

After this operation it was arranged that further observations on this subject should be entrusted to sub-committees.

REPORTS OF SUB-COMMITTEES.

ON VOLTAIC NARCOTISM.

Report of a sub-committee, consisting of Dr Richardson, Mr Hockley, and Mr Kempton.

"The sub-committee met on Monday, April the 4th. One patient, a man twenty-four years old, presented himself to have the second right upper molar tooth extracted. An attempt had previously been made on the Friday preceding to remove the tooth, and the crown had been broken off. Since then the tooth and its surrounding structures had been excessively sensitive, so that the parts could scarcely be touched. Four minims of tincture of aconite and ten of chloroform on lint were tried to be inserted into the tooth, but could not be got into any cavity, the broken surface being smooth and flat. The pledget was then laid over the surface simply, and the point of the negative pole from the twelve cell Smee battery was pressed into it. The positive pole of the battery tipped with lint, saturated with eighteen minims of Battley's solution of opium, was applied to the gum interiorly to the tooth. The circuit being thus closed the contact was sustained for seven minutes and a half. The positive pole was changed to the surface of the gum, anteriorly to the tooth. Contact was again sustained for seven minutes and a half, and the poles being removed, extraction was performed. The operation was unusually severe, three attempts having to be made before removal, with considerable force.

"*Result.*—The signs of pain expressed were very severe.

"The sub-committee observes that in this case no alleviation of suffering was obtained in the dislocation, and on examination it was found that the narcotic solution had not entered the tooth at all. The external parts which had before been so sensitive were rendered quite insensible."

Report of a sub-committee consisting of Dr Richardson and

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Mr Kempton. The sub-committee state "that four operations have been performed.

"The first patient was a man; the tooth to be extracted was the upper wisdom tooth of the left side. Into the cavity of the tooth a pledget of lint was introduced, moistened with three minims of tincture of aconite and ten of chloroform. The extreme point of the negative pole of a Pulvermacher battery of 200 elements was bound in the wool; the conductor of the positive pole tipped with moistened sponge was applied behind the ramus of the jaw, externally. The current was sustained ten minutes, when the poles were removed and extraction made.

"*Result.*—There was no indication of pain, and after the extraction the patient affirmed that he had felt nothing whatever. He heard a noise on the dislocation being made, but was conscious of no hurt. He complained that at first the passage of the current gave pain, but this passed away, and a feeling of complete numbness supervened.

"The second case was in a female; the tooth to be removed the second lower molar. There was a deep central cavity in the tooth. The cavity was plugged with lint, saturated with five minims of tincture of aconite and ten of chloroform. The Pulvermacher battery was used exactly as in the preceding case. The current was sustained for seven minutes, then the negative pole was removed from the tooth, and a fresh piece of lint, with the same amount of solution, was inserted. The pole re-applied, the current was kept up for five minutes longer. After this the poles were removed, and extraction performed.

"*Result.*—There was a slight start at the moment of dislocation; but the patient afterwards stated that she felt a shake, not pain. As in the preceding case, there was during the latter part of the application of the anæsthetic a complete numbness of the tooth, which extended along the jaw and into the cheek.

"The third case was in a female; the tooth to be extracted the upper wisdom tooth of the left side. It was but little decayed, but was inflamed and intensely sensitive. The application of the narcotic solution and electrical current were made as in the two preceding instances, but the lint had to be applied over a slightly broken surface of the tooth. Three applications were made, each time for nine minutes. At the end of this period the external parts being insensible, and the tooth feeling to the patient very benumbed, the extraction was made.

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"*Result.*—Some pain was felt, but it was slight and indefinable.

"The fourth case was in a female; the tooth to be extracted a lower molar, with a large shallow cavity in the centre. The cavity was filled with a pledget of lint, saturated with the narcotic solution as before, one minim of creosote being added. The same battery was used, and the poles were applied as in previous cases. At the end of ten minutes, the external parts being insensible, and the tooth feeling benumbed, the poles were removed and extraction was attempted; the tooth unfortunately broke in the middle of the fangs.

"*Result.*—The pain of operation was very severe. The patient also complained of the pain produced in the first instance by the passage of the current.

"The sub-committee in presenting this report would prefer to leave the inferences to be drawn from it with the full committee."

SUMMARY ON VOLTAIC NARCOTISM.

The conclusions arrived at by the committee in relation to the eight observations described above are—

1. That the application of a narcotic solution to a tooth, in connection with a continuous current of electricity of considerable intensity, leads unquestionably to the production of local anæsthesia, so that in some instances the pain of extraction is entirely broken by it.

2. The anæsthesia thus produced is true anæsthesia, extending from the tooth to surrounding parts.

3. The process is limited in its application. As at present understood, it can be only used successfully in cases where the cavity of the tooth is exposed.

4. The time required in the application of the process in each case is a serious obstacle to its practical usefulness.

5. The pain produced in the first stages of the process, particularly when the tooth is irritable, is always complained of. The pain dies away, certainly, as the process goes on, but to be successful, there should be no pain at all during any stage.

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6. The above objections are too decided in character to enable the committee to recommend this process as a practice. The members are, nevertheless, of opinion that improvements of an important kind admit of being made in the process; and with the hope that the history thus put forward may serve as the basis of such improvements, they lay the results of their united labours before the profession.

The CHAIRMAN, in rising to move "That the Report be received," thought it right that he should make one or two observations before putting the resolution. At the October meeting the Council of the College of Dentists having been requested to appoint a Committee to investigate the subject of Anæsthesia in dental operations, and the effect of Electricity as an Anæsthetic, the Council immediately met; and they considered that in order to carry out all their observations fully they should invite the assistance of eminent members of the profession who had studied electricity in all its bearings. They accordingly invited Dr Richardson, who had used it greatly; Dr Lawrence; Mr Harry Lobb, and several others. Those gentlemen had been of very great assistance to the committee, and at every meeting had been punctual in their attendance. [Applause.] The committee had drawn up their report honourably and faithfully, and it was now in the hands of the profession to test. So particular had the committee been that they would not take the report of a single individual; no report was given of an isolated case, and all the operations had been carried on collectively. [Hear, hear.]

The motion for the reception of the Report was then carried.

The CHAIRMAN now said,—The Report having been received, he would invite a discussion upon it by the members present, and be happy to answer any questions that might be thought desirable to put upon it. He would beg to state one fact in addition to what he had before observed:—viz., that the committee had not confined themselves to any particular instruments, but had employed all the electrical apparatus which they could get, whether one patent or another; they had not chosen any one particular or intermediate current, but all the machines that they could command had been tried in every case, and they had all amounted to the very same thing. There could be but one opinion as to the continuous current, and nothing could be better than Smee's Battery upon that application.

Dr KIDD said that the medical profession were particularly indebted to the committee for their labours, and if they had not "commanded success," they had at all events "deserved it." [Hear, hear.] He thought it would be a pity that it should go abroad that the absorption of chloroform acted locally. He was satisfied that after 9 minims had gone into the lungs it acted in the ordinary way. He had known several instances in which 10 and 15 drops clearly produced Anæsthesia. He was satisfied that Dr Richardson's application was a valuable one, particularly about the lips, and that it operated in the way of producing an immense deal of good. He did not think it should go abroad amongst the dental profession that a combination of aconite and chloroform applied to a tooth, and then the electrical battery applied, produced Anæsthesia: it was the chloroform that was

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absorbed into the lungs which produced it. Dr Richardson's combination, he thought, was the whole gist of the Report. In cases of irritations arising from carious teeth a very small amount of chloroform and aconite would produce Anæsthesia. All the complex batteries that were used were evidently absurd and useless. The Committee deserved great credit for having gone through the matter so steadily and carefully, and the medical profession were, he repeated, much indebted to the College of Dentists for such a valuable Report as that which they had presented.

Dr Richardson remarked that in the cases alluded to he was particular in observing whether there was any general anæsthesia from the effect of the application of chloroform and aconite: but there never was in any degree: the Anæsthesia was entirely confined to the teeth and the gums. Even the gum on the opposite side was sensitive; the fingers and hands were perfectly sensitive; and the Anæsthesia in each case of the application was entirely local.

Dr Kidd observed that the fifth and seventh nerves were of immense sensitiveness, and required a great deal of chloroform. He still thought this, that the patient's mind was so much fixed in the tooth-drawing, it being a sort of new thing, that there was a mental process joined to the local effect of chloroform, that between the two and a very small dose of chloroform, there was what might be called local anæsthesia. He would carefully examine the lower limbs, which were first to come under the effect of chloroform.

Dr Camps said he did not pretend to have had much experience in the administration of chloroform, but it was his opinion that its application did produce local anæsthesia, and that Dr Kidd was not justified in affirming that local anæsthesia was not produced by the local application of chloroform. He did not present himself as claiming any large experience, but he still thought that he ought not to resist the evidence submitted by the report which had been read that evening —that chloroform locally applied did produce local anæsthesia, quite apart from its inhalation by the lungs. Though he was not one of the members of the College, yet, as a member of the medical profession, he had much pleasure in moving,—That the thanks of the meeting be accorded to the various committees for their labours on this most important subject; because, though they had not arrived at the success they had anticipated, yet, as Dr Kidd had said, they had deserved it, and it was a merit almost as much to deserve success as to obtain it. [Cheers.] Before sitting down perhaps he might be permitted to say that, in his judgment, the successful application of electricity should be looked for rather in its relief to disordered motion than to disordered sensation; and that would remove it almost out of the pale of application with regard to dental surgery. But he was very much inclined to the opinion that the medical profession had an immense deal to learn with regard to electricity and galvanism (using those terms in their general sense) in their application to impaired or perverted motion, rather than in cases of impaired or perverted sensation. Therefore he was not surprised that the committee had arrived at results in a great degree negative—that was to say, that whether the intermittent or continuous currents of electricity were employed, still the production of anæsthesia was not so certain as they had hoped.

Dr Kidd had very great pleasure in seconding the motion. He was sorry that an impression appeared to have been produced that he had found fault with the report; he had said the report was a most valuable one. [Hear, hear.]

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Dr CAMPS had not said that Dr Kidd found any fault with the report, but he merely stated that he thought Dr Kidd was not justified in affirming that local anæsthesia was not produced by the local application of chloroform.

THE CHAIRMAN said that the only difference of opinion was as to the production of anæsthesia, whether local or general.

Mr BETTS stated that from his own experience of electricity, he was fully satisfied with the results arrived at by the committee; their labours had been extremely arduous, and the report was highly to be approved of for its honesty, and the straightforward manner in which the whole of the experiments seemed to have been carried out by the committee. [Hear.]

Mr PURLAND said that as a member of the committee he had signed the report, and that he perfectly agreed with its contents. But when he contrasted the experiments detailed in the report with his own actual practice he was bound to say that he reversed that judgment *in toto*, for instead of having at the rate of five successes to sixty failures, he had found that he did not have one in ten as a failure. He did not consider that there was any anæsthesia in the matter, but he did believe that electricity alleviated the pain in a most remarkable degree; to a certain extent it removed the impression of pain and altered the condition of the patient altogether: there was something on the mind, and when that was diverted pain was insensibly manifested. He had extracted a great many teeth, as many as ten from one patient at a sitting, and it had been repeatedly declared to him that there was not the slightest pain. Although in some instances the convulsive motions of the patients had shown every indication of the most agonizing pain, yet when awakened out of the trance they had declared that they did not know that the tooth was extracted: therefore it was not quite true that the patients felt pain because their features expressed it. [Hear, hear.]

Dr KIDD wished to say one word as to whether small doses of chloroform produced anæsthesia:—there was a law of providence with regard to chloroform; were there was excessive pain a very small amount of chloroform sufficed; and where there was the slightest pain more chloroform was required. If it was very defined pain a very small quantity of chloroform would do. That was the result of the experience of Dr Simpson and Dr Snow. The point was an interesting one, as bearing on the use of aconite and chloroform in these cases.

Dr RICHARDSON said that Dr Purland and the College were not at issue in any respect; in fact there was no local anæsthesia from the intermittent current, but a diversion of sensation. With regard to the application of aconite and chloroform, it had a direct local effect wherever applied, but that was governed by the mode in which it was applied, and by the rapidity with which it was absorbed. The only use of electricity was that it produced a readier absorption, by the quickening of the capillary circulation.

Mr. HARRY LOBB said that the Microscopic Society were aware of that result of the increase of the circulation by the application of the continuous current; and it was known that when the circulation was increased, absorption went on more quickly. Under the microscope this fact could be demonstrated upon a frog, but the intermittent current had precisely the opposite effect; it had the power of contracting the minute arteries and arresting the circulation, that was the difference between the two—the intermittent current arrested the

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circulation, and the continuous current increased both the capillary and the arterial circulation.

The motion was then carried.

Mr PERKINS returned thanks on behalf of the committee.

The CHAIRMAN also, in rising to express his thanks, assured the members that the committee had been most anxious to do everything they could that might tend to the elucidation of facts. The council of the College had but one opinion, and their desire was to labour hand and heart to develope and exemplify whatever was laid before them. He would also state that the College was increasing in numbers, and indeed going on exceedingly well: the present season, now terminating, was a good augury of the forthcoming session. [Cheers.] There were four conversazione arranged, and an eminent lecturer was appointed to deliver a course of lectures similar to those of Dr Richardson. The school which had been formed would be in good working operation in October next, as its arrangements were well organised. He would also further observe that it was the intention of the College to grant dental certificates, and that examiners had been appointed among whom were some very eminent men, and he trusted that dental surgery would not be as it had been for a lengthened time, but that each and every one who felt an interest in the profession at large would unite, and let all petty differences cease, with one hand and one heart determined to go on. [Cheers.] He hoped that the end of this year would prove that there was but one wish amongst them, to exalt the *status* of the dental profession, and that all animosity would cease from the present moment. [Applause.]

Mr DOBIE begged to be allowed to express the gratification and high degree of pleasure which he had experienced in listening to the report of Dr Richardson, and also in hearing the satisfactory statement as to the prospects of the Society which had just fallen from the Chairman. He had come up to London for the express purpose of attending this meeting, and he should return to his practice in the country highly gratified and fully rewarded. He begged to move a vote of thanks to the Chairman.

Mr BETTS seconded the motion, which was then carried unanimously.

The CHAIRMAN.—I most humbly and most affectionately thank you for this mark of your respect. I am sure you will allow me to pay the meed of praise which is due to the other branches of the profession. We have many eminent physicians who have sent in their adhesion to us, offering their services to forward our views in every respect; and a great number of members of the College of Surgeons of England have assisted us, and are glad to find that we are going on well. This gives us encouragement to do our utmost night and day to carry on the College of Dentists of England. I am sure that I ought to pay that meed of praise which is due to them as well as to the other branches of the medical profession for helping us, they consider that we ought to be an independent body entirely; and such being their feelings, I hope the College of Dentists of England will live to become an entirely independent body. I thank you for your kind attention, this evening terminating the present session; and I hope we shall meet in health and strength to carry on the ensuing one.

The proceedings, which had been of a highly gratifying character throughout, were then brought to a close.

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LECTURE IX.

[*Delivered on February* 8, 1859.]

ON DISEASES OF THE TEETH AND MAXILLARY BONES ARISING FROM THE EFFECTS OF MERCURY, PHOSPHORUS, LEAD, AND OTHER POISONS.

Mr President and Gentlemen,

In the present lecture I shall have to bring before you a subject relating to the special influence of certain poisons on the teeth and their neighbouring parts. I have noted in the syllabus three poisons, viz., mercury, phosphorus, and lead; but I shall not hesitate to refer to one or two more as the occasion may require. The poisons which we have now to consider, as they are tangible poisons, as their chemical combinations are well known, and as their effects on the body are in some measure understood, come before us now with much less of obscurity than certain other poisons which we have already considered. Yet we shall find, in regard to some of these, that on the very threshold of our inquiry difficulties are met; difficulties which experiment truly can solve, but which, up to this time, have not been solved, either by experimental inquiry, or by observation of diseases accidentally induced by the agency of the poisons.

One difficulty of this nature stands forward pre-eminently in regard to the two last-named poisons on my list, phosphorus and lead; viz., whether these poisons produce their injurious effects locally or generally; in other words, by simple application to the parts affected, or by a general influence exerted through the system. This difficulty suggested, a second arises in the inquiry as to the chemical combinations which occur between the poison and the disordered part; and so I might go on pointing out other obstacles to our knowledge which have yet to be overcome, though they are of minor importance.

The effects on animal bodies of the first of the poisons named on our list, viz., mercury, are best known. The action of this

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poison is local as well as general, but the local effect is always secondary, that is to say, is through the system. When mercury is applied to the body topically, its effects appear, but the effects are not confined to the part at which the application was made, they extend to the body at large, and when the spot at which the poison was applied is influenced, the result occurs as in other parts, from an empoisoned blood. The poison is taken up into the circulation, is borne into every structure, is made to lave every structure, and thus universally penetrating, enters into chemical combinations wherever it finds affinities, and produces a general and widely diffused effect.

Mercury, in one or other of its forms, is a poison which finds entrance into the system by any channel. Inhaled in fumes, it passes readily into the blood by the pulmonic circuit; rubbed into the skin it makes its way into the soft tissues, and either by lymphatic vessel or venous, enters the blood's highway. Taken by the mouth, the absorption is as by the skin, but with greater rapidity. Hence, mercury has been for centuries past exhibited as a medicine, and sometimes as a poison medicine, by all these three modes of introduction—by the stomach, in form of pill; by the skin, in form of ointment; by the lungs, in form of vapour.

In like manner, mercury may be introduced into the body by any one of these means. Men who work in mercury, and who are of uncleanly habits, get the poison admixed with their food; or they absorb it from their hands. In some occupations, too, they inhale it by the lungs. Here the poison, as received by either process named, can hardly be said to be received accidentally; the men are aware of the exposure and its consequences.

Now and then, and perhaps more commonly than is supposed, the body is subjected to the poison in a way more insidious, and in a way purely accidental. Thus, I have an instance before me in which it is recorded that a hospital ward in France was fumigated with mercury for the purpose of destroying vermin. The ward was emptied of its inmates during the process; afterwards, when cleaned and refilled by its occupants, a new form of disease arose amongst them, which ended in the discovery that all of them were more or less poisoned by the inhalation of an air charged with mercury. Every inmate in the ward was salivated, and many weeks passed away before the cause of the distemper could be removed.

The condition of the system during the time when it is affected by the mercurial poison has not yet been sufficiently studied beyond the symptoms which are excited. The blood seems, however, to lose its power of healthy coagulation, it takes on a fœtid smell, and some new compounds are produced in it. The tissues are generally softened, and hæmorrhage from them is a common attendant when they are softened or injured. Ulceration is also

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an occasional accompaniment, especially on the surface of the mucous membrane; the spongy parts, as the gums, swell; the action of the salivary glands is greatly excited; the bones are affected with pains, and all the fibrous structures are subjected to a low and spurious inflammatory process.

The effect of mercury upon the teeth varies according to the age at which the poison is exhibited. It is a curious as well as a fortunate circumstance, that young children exhibit a tolerance to this poison, which is possessed at no succeeding age. But infants are now and then, even in these enlightened times, subjected, either by ignorance or accident, to a mercurial course, which is lamentable in its results. If this is done before the cutting of the temporary teeth, the gums are subjected to widespread ulceration, and symptoms resembling cancrum oris are the result. When the period for cutting the teeth comes on, it is attended with much additional suffering, and the teeth evolved are dark, brittle, and notched, becoming speedily carious. I have several times seen children who were merely suffering from the irritation of dentition treated by mercury for some imaginary visceral inflammation, and with consequences to the teeth themselves little dreamt of. The practice of chemists who prescribe calomel to infants for any possible disease, on the kill-or-cure principle, is specially open to this ignorant accident. An infant six months old was once brought to me in my public practice, which well nigh lost its life from emaciation thus produced. The gums along the upper ridge presented a deep ulcerous line, the cheeks were ulcerated, the tongue on its under surface presented a deep, foul, ulcerous patch, and from the fact that pain prevented the introduction of proper nourishment, the body was reduced almost to the fact of dissolution. Under careful nursing, and by withdrawal of the poison, the recovery took place; but the teeth made their appearance in the dark semi-destroyed condition to which I have alluded, they decayed rapidly, and by the time the last molars were evolved the incisors were entirely lost. If I might use the expression, the teeth were shelled as soon as they were shed. After the occurrence of such accidents as these during the first dentition, the teeth of the second dentition not uncommonly suffer; suffer in a minor degree certainly, but in a sufficient degree to impair materially their after usefulness. The teeth thus modified by an interference with their nutrition in the early stages of their growth, are thrown out imperfectly developed. They are often small, dark in colour, brittle, and prone to decay. The pitting of teeth is, I believe, by no means an uncommon result from this cause.

On a previous occasion I referred to the theory held by Dr Harris and many other authors, that the pitting, and the carious tendency obvious in some permanent teeth, are due to the occurrence of the eruptive diseases during the period of the forma-

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tion of the permanent teeth. Since I offered those observations I have read with much instruction and pleasure a paper by Mr Salter, in the Guy's Hospital Reports, in which the subject here touched on is very ably discussed. I would not dogmatize on any account, but I must add that to my mind the theory that the eruptive diseases of infancy produce imperfect development of the permanent teeth is based on no satisfactory data. We have seen what syphilis will do when hereditarily transmitted to the child; now we see what mercury will do when administered to the infant during the period of formation of the permanent set; and if we have not seen that the special disorders of the teeth adverted to by dental authorities are absolutely produced by mercury, we are sufficiently acquainted with the effects of mercury to lead us to this primary conclusion; that before it can be proved that certain cases of dental disorder are referable back to eruptive disease, it must be shown definitely that the eruptive disease itself was not treated by mercury.

This granted as an essential element in the argument, the medical evidence becomes of most weight. And this, as a medical man, I must again state as embodying not only my own experience, but the general observation of all the medical friends whom I know; that eruptive diseases occurring in the first months of life, despite their severity, are not ordinarily succeeded in after life by any peculiarity relating to the teeth. But it is clear by the simplest logical rule, that if the eruptive diseases severely developed will produce dental disease in one child, they will do the same in all, for the same reason as that small-pox pits the skin of every one it taxes, and that scarlet fever is not scarlet fever without the specific eruption which marks it. The fact, however, is, that the dental disease is the exceptional, and I say it from fact, the very exceptional follower of the simple eruptive disorders; a fact which can only be accounted for on the ground of an exceptional cause. If then, this exceptional cause be not syphilis, let us turn, not to the eruptive diseases as simple causes, but to the eruptive diseases as complicated in their treatment, by the ignorant or accidental exhibition of a medicinal poison.

The administration of mercury during the period of the shedding of the temporary teeth, and the production of salivation by this measure, is a result which for the time is very serious. It is true that there cannot be said to be any cutting of these teeth, and that the undermining of the temporary teeth prevents the expenditure of any considerable suffering. But there is nevertheless, in many cases, a considerable irritation of the gums—an irritation which the use of mercury at the time very considerably intensifies.

A little girl was under my care, a few years ago, with pneumonia, for the which I treated her with small but frequently

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continued doses of calomel. Unexpectedly I had to leave my home for a few days on business, and a medical man took charge of the case without having had the opportunity of hearing from me the history of the treatment. He therefore, thinking mercury required, gave it more freely, and ordered its continuance until my return. The result unfortunately was, that the child was terribly salivated; the gums were ulcerated along the whole of their borders, and the temporary teeth actually sloughed away in a body. As recovery took place, hard cicatrices formed over the upper margins of the gums, and impeded materially the evolution of the permanent teeth, rendering the second dentition exceedingly painful. It is interesting, however, to state, that the permanent teeth were entirely uninjured, and at the age of fifteen this young lady presented a line of unimpeachable masticators. This same fact I have more than once witnessed as occurring after salivation during the later period of the first dentition. The permanent set are indeed so far formed at this time that their development is not retarded.

When the body is salivated in adult life, the teeth, though they may become loosened during the salivation, are not necessarily injured, *i.e.* if the salivation is continued within bounds. But in prolonged salivation the teeth may become so loosened as to fall out; and in olden times, when mercurial salivation was carried to the last extremity of danger, the teeth are reported to have fallen out in the mass, and the jaw to have exfoliated from necrosis.

As regards the effect of mercury on the "vitality" of the teeth, Mr Hunter has an observation of much interest bearing on the old operation, now extinct, of transplantation of teeth. He directs that no person should be exposed to the process while taking mercury, even although the gums are not affected by it at the time, inasmuch as the gums may become affected before the teeth have become fixed. He adds, "I would carry this principle further, no one should have a tooth transplanted who has any complaint that may subject him to the taking of mercury before the tooth is fixed."

I have said that the production of moderate salivation does not necessarily destroy the teeth in the adult, though it may loosen them for a time. This is the general rule, and it is also the general rule that the teeth are refixed in their sockets as the effect of the mercury subsides. But the rule has its exception, for sometimes, as has been well observed by Professor Bell, even when the effects of the mercury have fully subsided, and no permanent injury seems to have been inflicted on the teeth, it happens that after a longer or shorter time, even after the lapse of several years, "the teeth become loose, absorption of the gums and alveolar processes takes place, and the early loss of the teeth is the consequence of an affection, the disappearance of

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which, for so long a time, had persuaded the patient that all danger of subsequent injury had ceased."

It will be gleaned from the above that the evil effects of mercury are not confined exclusively to the teeth, but that they extend to the alveolar process. The fact is so; in cases of salivation carried to the extreme the bone structure is more prone to the destructive process than the tooth itself. In instances where the death of the alveolus occurs in early life, a process of reparation may take place in a way which is as admirable as it is effective. The author whom I have referred to above supplies us with an illustration which is too appropriate to be omitted at this point.

"A child, about three years of age, was brought to me having a most extensive ulceration in the gum of the lower jaw, by which the alveolar process was partially denuded. The account given by the mother was that the child had some time previously been the subject of measles, for which a chemist whom she consulted gave her a white powder, one of which was ordered to be taken every *four hours*. It appears by the result that this must have been calomel; for, after taking it for two or three days, profuse ptyalism was produced, with swollen tongue, inflamed gums, &c., followed by ulceration of the gum, lip, and cheek. On examining the denuded alveolar process, I found that a considerable necrosis had taken place, including the whole anterior arch of the jaw, from the first molares on the left side, to the cuspidatus on the right. By degrees the exfoliating portion was raised, and became loose; when I found that it was not confined to the alveolar process, but comprised the whole substance of the bone, within the space just mentioned. It appeared, however, that as the necrosed portion became gradually detached, new bone had been formed underneath it, extending continuously from one side to the other, and forming a new chin. At length the loose bone came away, including the seven teeth above mentioned and the rudiments of the corresponding permanent ones, and consisting of the whole section of the jaw with the entire chin. I directed that the jaw should be supported, and that mastication and all violent exertion of the muscles should be avoided for a time, the child being restricted to fluid food; and after a few weeks he ceased to experience any inconvenience. When I last saw him he was about nine or ten years of age; the face was but little disfigured by the loss, excepting from the want of the anterior teeth; and the chin had scarcely any appearance of deformity."

The same conservative tendency may even occur in later life. Mr Fox, who saw the effects of mercury carried to an extreme, which is not known now, relates a case which occurred in Guy's Hospital, in which, "as the result of salivation, a large piece of the lower maxillary exfoliated. During the progress of the exfoliation, so large a deposit of new bone took place, around the dead portion, that it became, as it were, enclosed in a case; and after it

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came away, the new bone was rounded, and the gums healed over very perfectly."

It is a question of much import, in what way the mercurial poison exerts its influence on the dental structures? I am not sure whether a solution of this query is at this moment possible, but if I might be allowed a suggestion, it would be that the mischief first commences in the gums, and is then extended along the periosteum lying between the root of the tooth and the alveolus. This view of the case has at least this in its favour, that it explains all the phenomena, both of disease and cure. If the dental pulp were primarily affected there would be intense pain, and the death of the tooth would be in all cases a nearly necessary result, neither of which coincidences is, as we have seen, a necessary consequence.

A brief word is required regarding the method by which the mischief in the periosteum is effected. Is it that the salival secretion so copiously thrown out acts as a local irritant, or is it that the disease is communicated by the blood? Taking all things into consideration, I opine that the primary mischief in the gums is antecedent to the increased discharge of saliva, and that the disease is directly conveyed by the blood to the affected structures.

It will be remembered, probably, that in a previous lecture I observed on a condition of gum, in which the gum, structure was spongy, and readily inclined to bleed on slight provocation. I then noticed that a condition called spongy gum might be mistaken for what may be called mercurial gum, and I quoted a case in which this error had occurred. I note the fact again now, to draw attention once more to the diagnostic fact which it includes. Whenever a spongy condition of gums is met with, it is the first duty of the practitioner to inquire as to the possibility of mercury as a producing cause. Ordinarily, the salivation, and the peculiar heavy fœtor of the breath, will guide to the facts presented. But these may fail, as in the case I have narrated, and then the history of the case, the history of the treatment which the patient has been pursuing, the history of his occupations, or of the accidental risks to which he has been subjected, confer the only clues to the disorder as produced by a mercurial poison.

I may here mention, incidentally, the effects of one or two other substances which in poisonous doses produce swelling of the gums and loosening of the teeth. Oxalic acid is one of these substances, and in a case I have related the salivation was so marked that every tooth was rendered loose.

When, some years since, I was living as an assistant in the country, I called to see a man who was under treatment for phthisis, and who complained to me that all his teeth were loosened. As the man was not taking mercury, and had never

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taken mercury, I was surprised. But on naming the circumstance to the practitioner with whom I resided, he referred the symptoms at once to conium, an anodyne remedy which the man had taken for many weeks past. The medical gentleman to whom I refer, the late Mr T. Brown, of Saffron Walden, used conium largely in his practice, and assured me that I should soon see with certainty that this medicine would salivate. Since that time (1847) I have watched the effects of conium with some interest, and I can state that in some persons the medicine does produce a salivation which might be mistaken for mercurial salivation. The mischief is, however, mainly confined to the gums, and the teeth speedily refix when the agent is withdrawn.

Necrosis of the jaw, from subjection to the fumes of phosphorus, is a malady new in this age, a malady induced, we may say, by civilization. Let us not attribute to civilization any evils of body unwarrantably, for the great fact is in favour of decrease of disease by the progress of our race. There was never a time in the social history of the world when disease, as a common evil, was more subdued than in the present. But this one disease of which I speak is the result, as I have said, of an improvement in the social arts, and is peculiar to the period. It is not a common disease, and it is a disease which may be entirely prevented without interfering with the conveniences of life by one iota.

The nature of the disorder is usually indicated pretty clearly by the history supplied by the patients. The patients are employed either in the manufacture of phosphorus, or in the manufacture of some other material in which phosphorus plays a part; the manufacture of Lucifer matches being the principal source of the malady. It would seem that all who are exposed are not equally affected, that some escape while others suffer severely, and that some may labour for years without suffering, and then suddenly become the victims of the malady. It is difficult to assign a reason for these occurrences.

The symptoms first complained of when symptoms are manifested are often referred to the teeth; there is a deep-seated ache, having, as it were, a tooth for its centre. But the pain is different from true toothache. It is not referred to the tooth alone, nor is it attended with the twinges which mark toothache. It extends from the tooth steadily and persistently along the jaw, and pain, moreover, is manifested in the jaw, and intensified whenever the jaw is percussed. In time the disease is concentrated in the jaw, and the teeth are comparatively easy. The pain has many of the characters which would indicate a slow inflammatory process in the bone; in the end thickening takes place, the suffering assumes an intermittence, hectic supervenes, there are copious night sweats, and if relief is not obtained by operative measures the bone ulcerates away, and death by exhaustion is the

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result. Let me add that the symptoms are very prolonged in their duration, that they extend often over periods of one, two, or more years; and that they are not removed, after they have once set in, by removal of the poison.

The symptoms of phosphorous necrosis might, in cases where the history of the case is obscure, be mistaken for caries or exostosis of the teeth in the early stages; and in later stages for simple necrosis of the jaw, the consequence of syphilis, or mercury, or of an injury externally applied. Occurring in the upper jaw, it might be mistaken for disease of the antrum, from the which it may be diagnosed by the remembrance of those symptoms which I have already supplied as indicating the difference between accumulation of fluid in the maxillary series and enlargement of the maxillary bone.

It is a very singular fact that the phosphorous necrosis extends only to the maxillary bone. During the period when the maxillary bones are affected the other parts of the osseous framework may be all sound; nor does it seem either to affect the teeth primarily; the pain in the teeth at early periods, and the necrosis of the teeth at later periods, being simply conveyed from the bone structure to the dental.

The nature of the change which occurs in the bone has not as yet been made out. There are, apparently, indications in the first instance of a diffuse inflammation extending, as it were, through the whole bony texture. This is followed by death of the bone, with attempt in parts at regeneration, *i.e.* a true necrosis. But how this is brought about is the point. All we can suspect is that the effect is chemical. We know how important an element phosphorus is to bone; we understand its affinities for other of the bone constituents: and the supposition that strikes us à priori, is, that some new combination is set up between the phosphorus to which the bone is unduly exposed, and the other chemical elements upon which combination the disease is based.

This view is rendered probable by the circumstance that a certain long period of exposure to the phosphorous poison is required to produce the result. In cases where phosphorus has been accidentally taken as a poison the necrosis of the jaw is not a special after symptom; and in cases where phosphorus is used occasionally but not unfrequently, as by the working chemist in the laboratory, the necrosis is a thing unheard of. I believe, too, that in manufactories for phosphorus itself the disease is much less common than in other manufactories where the prepared phosphorus is used, a circumstance explained easily when it is recalled, that the phosphorus, as it distils over in its manufacture is received under a fluid for which it has no affinity, and beneath which it is fixed. The influence possessed by phosphorus for the production of maxillary necrosis is confined to the true or common phosphorus. That variety known as the red or amorphous

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phosphorus, while as regards application to the arts it has many of the qualities of ordinary phosphorus, is incapable in any way of producing the necrosis. This fact is of great moment in the matter of prevention, as we shall see in time.

It has been already remarked, that when a person is subjected to phosphorus as a general poison, or when subjected to it in medicinal and carefully repeated doses, the necrosis is not a necessary consequence. This observation gives rise to another observation having much the same meaning, though different in character. It is this, that during the existence of necrosis of the jaw from phosphorus, none of the general signs of phosphoric poisoning are present. As a general poison phosphorus acts like antimony in many respects; it produces ulceration of the alimentary canal, great fluidity of blood, intolerable depression and death with diarrhœal or hæmorrhagic flux. Those interested in the facts relating to the general effects of phosphorus will find them all very copiously illustrated in my forensic half-yearly reports on forensic medicine, in the 'British and Foreign Medico-Chirurgical Review,' for the last three or four years. I must be content with this reference, and with the bare statement of the fact I have announced, that the special phosphorous necrosis is disconnected with the general symptoms of phosphorous poisonings.

In precisely the same way, none of the symptoms produced by the medicinal use of phosphorus, such symptoms, for instance, as priapism, are present in cases of phosphorous necrosis.

These facts lead us, then, to ask, how is the effect of phosphorus on the maxillary bones brought about? The opinion first advanced, if I mistake not, by Mr Simon, is now being pretty generally admitted, that the effect is purely local. That the poison, in form of a volatile acid of phosphorus, such as the phosphoric acid, is absorbed by the salival fluids, for which it has strong affinity, and that thus the bony structure is directly attacked. I should infer that the enamel of the tooth ordinarily escapes; and I should infer that the jaw escapes so long as the teeth continue sound and the alveolus protected. But when teeth become carious and the alveolus is exposed, the local malady commences, and extends slowly and insiduously along the maxillary structure. This view explains the phenomena, and accounts for the apparent anomalies. It explains, for example, why one maxillary bone escapes while the other is affected. It explains why one workman escapes while the other is affected. It explains why the same person has immunity from the poison for many years, and then becomes affected, and it explains the confinement of the disease to one particular set of bones; and finally, it explains the absence of the general symptoms of phosphorus as a poison during the presence of the local necrosis.

The prognosis, or prophecy, in cases of phosphorus necrosis, is always unfavourable; unless prevented from extension by surgical

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interference, the disease is commonly fatal; while all diseases which depend for eradication on the knife are decidedly and allowedly of a class in which the result is calculated on with extreme anxiety.

The influence of lead on the dental structures is confined chiefly to the gums. In so far as I am aware, the teeth and maxillæ rarely, if ever, undergo direct structural change from this poison. Neither is the condition of gum of vital import. Indeed in practice the modification observed in the gums is rather considered in its bearings on points of diagnosis than on matters of pathology.

The observation has been current for some years that in cases where the system is impregnated with lead, the gums present along their dental border a blue line. The line is narrow, and it may present different shades of colour, varying from a light leaden hue to a darkish blue or purple. At the point where this line exists, the gum structure is not sensitive to pain, and when pricked the blood which exudes from it has a dark appearance and feeble coagulating power. The production of the line is unattended by pain, and indeed is often unobserved by the patient. The structure is rather harder than natural, and there is some degree of shrinking. The line in many instances gives the first indication of the fact that the system is charged with the lead poison.

Regarding the cause of the blue line many views have been advanced; but the happiest description of its causes is, I think, offered by Dr Brinton. The causes, according to this view, are systemic as well as local. It must be premised that in all cases where the line appears the patient has previously been poisoned by lead. The history of the patient may indicate this, for he tells the story in recording his occupation—he is a painter or a card glazier, or a worker in lead in some form or other. Add to this he is not, if you can elicit the truth, of very cleanly habits; he eats his bread and cheese without previous ablution. Anyway he has consumed the poisonous agent, and the poison has to be eliminated. If Dr Brinton's theory, then, be correct, the elimination of the poison is carried on, in part, by the salival glands, and the saliva is thus charged with a lead compound. This saliva leaving the gums, leaves a deposit on the marginal ledge adjoining the teeth. These steps accomplished, all that is required to produce the discolouration is the presence of a minute trace of sulphur, a substance which at once blackens lead. The opportunities for exposure to this agent are many. In ill ventilated chambers it is in the air in the form of sulphuretted hydrogen. In some instances it has been detected in the saliva in the form of a sulphocyanide salt. It may again be thrown off from the body in form of sulphuretted hydrogen, in emetations from the stomach, and in some conditions of pulmonary disorder, it is

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evolved in respiration in the form of sulphide of ammonium. Thus there are ample means by which a lead solution lodged in the margin of the gums may be chemically blackened, by being converted into a sulphuret—and Dr Brinton opines that the dark line which is now noted is produced by the sulphuret of lead, deposited in the way I have defined. One very acute observation by this author lends great support to his argument, viz., that the line is best marked in parts most exposed to the air, and that it abruptly ceases at points where the mucous membrane has closed over an extracted tooth.

As the peculiar condition of gum here observed is not, as it would seem, injurious to the teeth, it might be left with this brief note as to its probable cause; but there is one point of practical interest in regard to this line, which it is of importance to the Dental practitioner to remember.

Instances of lead poisoning in the community are much more frequent than is commonly supposed, the source of the poison being water retained or transmitted through leaden vessels. This fact has been recently well explained by Dr Bower Harrison, who has collated numerous cases where persons, without suspicion of the fact, suffer from the effects of lead poison, under the names and titles of diseases altogether dissimilar.

Whenever, therefore, in his practice, the blue line is met with by the dentist, he has the opportunity of directing such inquiries as may lead to the discovery of the exposure of his patient to a poison; the systematic effects of which are often only discovered when they are advanced too far to be touched by medicinal remedies.

In some occupations in which the working classes are employed, the direct exposure of the teeth to the volatile acids leads to a rapid destruction. A patient who came before me with chest disease had so complete a disorganisation of the teeth that I was led to make inquiry into the causes, suspecting that mercurial salivation in early life was the root of the evil. He corrected this impression by telling me that the loss o teeth was the inevitable result of his business. And what was his business? It was that of a fur-dyer, and the cause of the disorganisation of the dental structures was nitrous acid, an acid evolved freely in one part of the dyeing process.

The object of the fur-dyeing process is threefold :—

1. To make bad furs look perfect.

2. To make the fur of one animal resemble that of another and different animal.

3. To change the colour of various furs.

The materials employed by the fur dyer for the completion of one or other of these processes are—nitric acid, sal ammoniac, liquid ammonia, antimony, verdigris, litharge, alum, copper, copperas, lime, pearlash, soda and gall-nuts. The nitric acid is used

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as a cleansing substance, and also as a staining substance to impart a yellow tint to some skins and lighten the colour of skins which are black. The sal ammoniac, lime, litharge, and soda, mixed up together into solution with water, are employed to remove grease from skins that are going to be turned into a dark colour. The skins are brushed over with this solution.

The colouring fluids used are, first, as we have said, nitric acid; secondly, a solution made as follows: Of copperas one pound, water twelve pints. This solution is used for producing a very black dye. Thirdly, a solution made thus: Gall nuts roasted and ground into a powder one pound; copperas three ounces; sal ammoniac two ounces; verdigris two ounces and a half; litharge one ounce and a half; copper dust two ounces; shumac three ounces; these are all mixed together with water, so as to make in the whole three quarts of solution. This colouring solution gives either a light or dark brown dye; light if much water is used, or if only one dressing is given; dark if the solution is concentrated, or if the fur is many times washed over with it.

When a fur is going to be coloured, it is washed over either with nitric acid or with the solution of sal ammoniac, lime, litharge, and soda, named above. The skin is then dried, and the dust is beaten out of it; then the colouring solution, whichever it may be, is applied with a stiff brush, time after time, until the desired shade is obtained.

For the colouring of grenadier's bearskin caps, gall-nuts are boiled with the solution to be employed. The grenadier's cap is soaked in the solution.

A variety of other solutions have been tried in the fur-dyeing business, such as indigo, muriate of tin, and muriate of iron. They all fail. The muriate of iron colours the fur, but destroys the skin.

The injuries to health arising from this business occur at different stages of the process. In the first step, where the solution of nitric acid is being applied, a curious set of symptoms appear. As the nitrous acid fumes are inhaled, the mouth, tongue, and fauces are rendered dry and irritable, there is constant constipation, there is constant headache, and the pain in the head is invariably situated in the back part. Later, the skins, moist with the acid solution, are placed (it is the fact) in an air-tight heated chamber to *dry*. When the door of this chamber is opened, there is a perfect flood of acid vapour set free, in which the workmen are bathed. The effect of the inhalation is invariably to cause cough, dryness of the mouth and throat, constriction of the chest, and pain in the head. *The teeth soon become cleared of enamel, and are eventually quite destroyed.*

When, instead of nitric acid, the second solution described above is used for the removal of greasy matter from the skins, ammoniacal fumes rise and excite a continued hacking cough,

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a languor, and a headache which can hardly be borne; a stranger to the work cannot tolerate it at all. The drying, after the application of this solution, is done as before, in a large air-tight chamber heated to 130° or more. The workmen have often to enter this room and remain in it for several minutes for the purpose of removing dried skins and turning drying ones. The effort against absolute suffocation is tremendous during the performance of this duty.

It is but right to add that in some manufactories, as at Appold's, the principles of common sense in drying have prevailed, and that a ventilating shaft has been introduced into the heated chamber, through which the gases can escape. In smaller manufactories no such provision is made.

A third and serious mischief is produced by the inhalation of the dust during the beating of the dried skins which have been previously soaked in the copperas solution. The dust thus discharged produces constant irritating cough, *and the teeth again are almost invariably affected by it; these organs are slowly rendered brittle, and generally carious.* The grinding down of the colour stuffs from the crystalline to the pulverulent state leads to similar evil consequences.

I am sorry that I have not sufficient knowledge of the dental art to offer any definite opinion as to the use of arsenical stoppings for teeth, or as to the effects of arsenic in arresting or inducing caries. I think I can pretty safely state, if I have not done so already, that arsenic administered internally as a medicine, and continued for a long period, does no injury to the dental organs. But in regard to the act of filling the teeth with arsenic the dental profession must be the judges. I find much discrepancy of statement on the point amongst dental authors. Mr C. Barrow, in the fourth number of the 'Quarterly Journal of Dental Science,' maintains that arsenic exerts the same antiseptic properties on tooth structure as on other parts, and that it arrests caries. Mr Matthews, on the other hand, looks on arsenical filling with dread. He is convinced that arsenic sets up inflammation of the pulp and consequent destruction of the tooth structure.

The treatment of the teeth and their neighbouring parts, after the effects of the poisons which have been named, consists rather in the employment of general than of local remedies. In disease produced by the mercury, the local treatment cannot be too simple or too expectant. In all cases, whether occurring during the first dentition or in adult life, it is best to avoid as strictly as possible all attempts to remove the loosened teeth. It is extraordinary, how firmly teeth, which might almost be picked out of their sockets by the fingers during the period of salivation, will refix as the system gets clear of the poison. Above all things, it is advisable not to interfere with the gums. If you lance them they bleed copiously at first, and ulcerate

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afterwards. If you leech them, the consequences are the same, or are even more severe. If you apply caustics, ulceration is also secured.

Local applications in the way of astringent washes may, however, be employed with benefit; and for this intention alum solution is best; it is an astringent, and is not a caustic. I have sometimes added to this solution, when hæmorrhage has occurred, a little tincture of catechu, the active principle of which is the tannin it contains.

To remove the fœtor arising from the ulcerated surfaces, charcoal is an efficient remedy. I found more relief from this simple measure than from any other in the last case of salivation I had under treatment. Two or three drams of charcoal were suspended by agitation in a tumbler of water, and the patient was made to gargle freely, and after retaining a portion of the gargle for a little time, to rinse the mouth with warm water simply, so as to remove the dark particles. This process was repeated several times in the day with great relief.

Medicinally, the iodide of potassium is now considered as the best remedy for mercurial poison. The medicine is given in doses of from three to five grains three times daily, in some simple bitter infusion. The theory as to the mode of action of this medicine is, that it eliminates the mercury by chemically combining with, and converting it into the iodide of mercury, a salt which is readily thrown off by the urine.

Hygienically, a great deal may be done. The room of the patient should be ventilated freely. The most sustaining foods should be supplied; wine may be given with advantage, and when the patient is able to leave his bed no delay should be offered. Care is required, however, to prevent exposure to heats and colds, for the mercurialized body is specially susceptible to congestion of visceral organs, and to the subsequent development of a low or adynamic inflammation.

The treatment in cases of poisoning by phosphorus is often made first to commence with extraction of the teeth. A very good illustration of this method of treatment will be found in a case recorded in the last number of the 'Quarterly Journal of Dental Science.' The extraction does no good; on the contrary, if the patient is still at his employment, extraction adds to the evil by increasing the exposure of the surface to the attacking agent. In doubtful cases, and when the patient is not employed at his dangerous business, the extraction of a tooth may be important in a diagnostic point of view. But the true remedial measure, the most speedy, as the most efficient, consists in removing the necrosed part altogether by the operation of excision. The steps of this formidable process are surgical purely, they require modification in different cases, and I must leave the history of these with the surgical authorities. All that the dental practitioner can do in true cases of phosphorous necrosis,

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is to form an accurate diagnosis, and to recommend as he honestly may, the speedy performance of an operation for the removal of the diseased structure altogether.

At the same time it is the duty of us all, in so far as it is in our power, to recommend measures for the prevention of this manufactured disease. It seems that several very simple means exist for applying the amorphous or red phosphorus to the same purposes as the injurious white phosphorus. This subject has attracted much more attention on the continent than in this country. Recently MM. Chevalier and Poirier have published a report on this interesting topic, in which, after showing the dangers, accidental and criminal, accruing from our present methods of employing phosphorus in the arts, they suggest the interdiction of the fabrication of chemical matches out of ordinary phosphorus, and the substituting in its stead red phosphorus, either by employing the formula in which the latter substance enters into the constitution of the paste, or by making use of Lundstrom's Swedish process, of which the brothers Coignet are proprietors, and which consists in the preparation of a paste that cannot be inflamed except by friction on a small board covered with red phosphorus.

It is readily seen that matches thus prepared, having no phosphorus in their composition, but requiring friction on a slip covered with phosphorus, would cause a great diminution in a number of accidents. Independently of the removal of dangers arising from poisoning and fires, the employment of red phosphorus, on account of its harmlessness, presents yet another advantage, with reference to public hygiene. It would protect the unfortunate workmen employed in manufactories where phosphorous matches are prepared, from those attacks of necrosis of the maxillary bones, under which they succumb after having experienced sufferings of the most intense character.

MM. Chevallier and Poirier add that they could cite a large number of instances of these affections, which have been the subjects of interesting works by Heyfelder, Rousel, Strolh, Boys de Loury, Chevallier, Perry-Sedillot, Maisonneuve, and Lailler-Trélat. These savants have successively determined that the effects of this disease are so much the more terrible, as they are too difficult to cure. According to their accounts, of sixty subjects attacked, more than half succumbed. This number is truly not exaggerted, for both in Paris and in the country there are many workmen who make chemical matches in the same place where their family sleep, eat, in a word, live. How many accidents, how many diseases, how many mysterious poisonings, result from this state of affairs, which would disappear by the employment of red phosphorus!

MM. Chevallier and Poirier consider that the slight difference in price has, up to this time, prevented the substitution of red for ordinary phosphorus; but this difference is so small, that it

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cannot be placed in comparison with the danger which accompanies the employment of ordinary phosphorus; and they opine that this slight increase of price will not prevent the consumer from profiting by the advantages which red phosphorus presents as regards hygiene and public security.

No special local treatment is required for the gums in cases of lead poisoning, for the local disease passes away as the general cure is effected. As with mercury, the popular medicinal antidote for lead is the iodide of potassium. The action seems to be the same in both cases, a salt of iodide of lead is produced, and the elimination of the poison by the kidney is provided.

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LECTURE X.

[*Delivered on February* 15, 1859.]

ON DIET AND MODES OF LIFE IN THEIR INFLUENCE ON THE ORGANS OF MASTICATION.

Mr President and Gentlemen,

The effects of habits and modes of life in modifying the structure of the dental organs have been stated by various authors with so much variety of opinion and so much contradiction, that it would be impossible for the most candid and industrious exponent of the views of authors to offer any shade of independent opinion without finding himself in opposition at some one point or other.

With the fact, therefore, fully before me, that it is hopeless to attempt reconciliation of opinion, I shall strive rather to put the subject forward in my own way, collecting together such facts as experience and reading have placed before me, and commenting upon them in such manner as shall seem most in accordance with common observation and common sense.

In the preceding lectures, much of the groundwork of the present lecture has been occupied. We have in those lectures traced out the constitutional and many of the local causes of dental disorder, the narration of which has led us to notice many other points regarding diet and occupation. I shall therefore, on this occasion, have to supplement, merely, that which has gone before, and if omissions seem to have been made in a subject of such breadth as the one before us, I must intimate that the omissions are intentional, and are made for the sake of avoiding needless repetitions.

For indeed, in a strict sense, the meaning of all our labours lies enrolled in the correct understanding of diet and modes of life. We have urged that the causes of all diseases are external to us, and we to them; we take up the causes of diseases as we

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take up water, and air, and food, and we take them up in such a way, that whenever we do take them, it is in diet or in mode of life.

The simple but effective construction of a tooth in the adult is strikingly corroborative of the view that a structure so perfect in all its attributes, and so fitted for the functions which it has to perform, can be made subject to disease by no slight causes, independently of those which result from accidental mechanical injury. Let us consider this construction for a moment. The enamel or presenting part is divested entirely of active chemical affinities for external bodies. It contains but a trace of water, its parts are combined in the closest possible bonds, it is as perfect a non-conductor of electricity as glass or resin, it has no nerve supply, and is therefore unimpressionable to external agencies. The nutrition of this enamel structure, moreover, is so slowly conducted, that its displacement from the organism and replacement may rather be counted by a lifetime itself, than by any epoch in a life. This fixidity of structure must not, however, be accepted as so favourable to permanency as the other qualities above named; for as the enamel, notwithstanding its physical and chemical resistances, is subjected to chemical and physical agencies, which sometimes it cannot overcome, it suffers, and being fixed as regards construction, is slow to repair.

The entire occlusion from air, and from other external agencies of the buried portions of the tooth, of the crusta petrosa, the dentine and the vascular pulp, gives of necessity to these parts an immunity from the causes of disease such as are not anywhere expressed in the economy, while the vascular and nervous supply passed to the dental structure through firm bony canals, are secured with a regularity and force which is unequalled in any other set of organs.

With these considerations before us, it is not to be wondered at that amongst nations composed of men in whom hereditary disease is unknown, into whose lives vice has no entry, and into whose bodies the poison luxuries find no channel, that in these the dental organs should be in such perfect order as to excite the admiration of travellers from climes more civilized and less happy.

In considering the influences of habits and modes of life on the dental organs, we must begin with the fact clearly before us, that these act in two ways, systemically, *i.e.*, through the system, and locally, that is, by direct effect on the teeth themselves. I dwell on this simple fact, because we have seen in late discussions that eminent dental authorities have been ranged into two parties, the one contending for the pure local cause, the other for the pure constitutional cause.

The truth seems to me to lie in the mean, and what is more, I

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conceive that many cases occur in which both local and constitutional causes are acting at one and the same time. I see this fact often illustrated in ill-fed or improperly-fed children. A child, born perchance with an enfeebled build, is pampered with materials for its daily wants which are dictated only by caprice, and given for the sake of idleness or desire for quiet on the part of the parent. Such child, treated with acid fruits, and provided with sustenance which cannot support its growth and development, is directly subjected to both sets of destroying evils. The teeth improperly nourished by blood at a time when they require such nourishment most, are being subjected to external agents which exert a direct chemical effect, and under the combined causes the teeth of necessity become destroyed. We shall see as we progress, that in adult life the same influences in their combined form are sustained.

In following out my scheme, I shall not take up these sets of causes separately, but shall prefer to consider them as acting simultaneously or separately under differing conditions.

The first point that arrests our inquiring attention is the question—whether or not sex exerts any influence on the teeth at any stage of life. If so; what are the causes of difference? We have no statistical data on this point by which we may be guided, and we must therefore speak from general observation. Speaking in this way, then, I for one should opine that dental disorder is more prevalent in men than in women. This remark, I believe, extends to most diseases of teeth, as caries, necrosis, exostosis, in which physical destruction of the tooth is concerned. In some other disorders where the tooth is not primarily affected, in such diseases as hysterical neuralgiac toothache, the general rule may be broken, but as these disorders are by comparison rare, they do not modify the general argument.

The reason why sex should influence the teeth in relation to their structural diseases, lies exclusively in habit, and in subjection to different external agencies. This seems proved by the fact that in cases where males and females live together, following almost the same pursuits and modes of life, the diseases of the teeth are nearly alike, and the same numerically. But men exposed in bodies to occupations and habits in which women have no share, come under new and important conditions, and are thus influenced in a manner peculiar to themselves.

The effects of foods and drinks on the dental organs act differently at different periods of life. In the first days of infancy the effects of food must of necessity act solely through the system, and when we remember the simple truth, that in their primary stages the teeth are composed of soft and exceedingly vascular stucture, that they are modifications of mucous membrane, and that their osseous structure is built out of matter, the nutrition of which is long active, and easily perverted, we have

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no difficulty in seeing that the supply of innutritious food must be a leading constitutional cause of imperfect dental development.

The errors in diet which lead to disease manifestation consist chiefly in the use of foods in which the earthy and the nitrogenous elements are deficient. Such foods, for instance, as rice, arrowroot, gruels, and messes made out of dried husks of bread. Upon these foods the infant starves, and the teeth, for the support of which materials so entirely different are required, starve most.

Amongst the children of the poor, again, a deficiency of health in the mother is the cause of similar degeneration in the dental nutrition. The mother, enfeebled herself, by subsisting on the bare provender I have noted, cannot in human possibility secrete from the breast materials in which her own system is deficient. Hence the breast milk fails in its nutrient office, and the infant body fails per sequence.

In cases of an opposite kind, over-feeding leads to similar consequences. In these cases the body does not possibly become emaciated, but the digestion is impaired, the salival secretion takes on an acid reaction, and the teeth suffer as a consequence. Such children are subjected to excoriations of mucous membrane and to apthæ; the breath becomes offensive, and the teeth are shelled at a period when, according to the ordinary course of nature, they would be most fully developed.

But if the use of improper food in the earliest days of infancy does injury to the temporary teeth, producing in them a premature decay, the effect is infinitely more serious, as it is made to extend to the permanent set. It is always a critical point in the management of infants, when the natural maternal food is being changed for the food which is to take the place of the mother's milk. The place of this nitrogenous, fatty, and saline food is too often filled up by a dietary in which only one of these elements is prominently supplied, and the result is, as before, a depraved nutrition generally, with special deprivation of the necessary elements for the dental structures. The permanent teeth are as a result delicately formed, and in after life, with the enamel imperfect and the dentine imperfect, they are susceptible to external agencies which on firmly-built organs would exert no mischief whatever.

The effects of foods and drinks on the teeth in adult life, have been variously classified. Some have assumed that the teeth are externally so protected that caries from external causes is next to impossible. Others have argued that from the permanent character of the dental organs, and from the fact that the permanent teeth are scarcely to be influenced by the introduction of agents into the system (madder for instance), the idea of a

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general effect through the system is unsupportable. It appears to me that the common-sense view in this matter is that the agency of food in the well-developed adult tooth is mainly external and chemical. What, then, are the influences of food? Do alkaline foods exert any effect? Do acid foods exert any effect? Do condiments exert any effect? Do foods of different temperatures exert effect? Lastly, do foods exert any direct influence? Let us discuss these points seriatim.

The effects of acids and alkaline bodies on the animal structures present some points of analogy, and some points of difference. On the fluid parts of the body and on the soft parts the alkalies and the vegetable acids exhibit traits as singularly analogous as they are practically important. Nay, the mineral acids, such as the hydrochloric when exceedingly diluted, presents a somewhat similar analogy of action. But on the hard parts, as on the bones and teeth, the effect is quite different. On these the alkalies exert little influence, and the acids one and all exert a material influence; for the acids having affinity for these earthy compounds, reduce these to new combinations, and produce an entire reconstruction, which being contrary to the natural law, is a necessary cause of disease. If, then, any chemical effect is produced by different forms of food, such effect is by the medium of acid solutions mainly.

Bearing on the effects of acids on the teeth, Mr Thomson has made some very valuable observations, which I shall repeat at some length, not only because they are of great interest to the dental practitioner, but because these lectures are likely ultimately to come into the hands of the medical profession, to whom Mr Thomson's labours will be of equal benefit. Mr Thomson is of opinion that all acids act upon the teeth, but mineral acids act more readily than those obtained from vegetables. The first experiment he made was to place a sound tooth in a glass containing nitric acid; the enamel was destroyed in half an hour, and in twenty-four hours there remained only a very small portion of the matter it contained, floating. He tried the same experiment with muriatic acid, and it carried on the work of destruction even quicker than the nitric acid. He next tried sulphuric acid. This, and the nitric acid, appeared to act at the same rate. He afterwards took a portion of each of these acids, and diluted them to the proportion of six parts water to one of acid, and in twelve hours the enamel of each was gone, and in twenty-four hours the animal substance alone remained, and this, when taken out of the acid, was very soft and flexible. In this case, too, he found that the diluted nitric acid was a little slower in its action than the others. After these experiments, he pressed the juice from a lemon into a glass, and put a tooth into it; in four days the enamel was destroyed. He then tried the experiment with the juice of a Seville orange, and the

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result was nearly the same as with the lemon. Mr Thomson afterwards put a sound tooth into some vinegar that had been used for mixed pickles, and this produced quite a contrary effect from any of the others, it shrunk up the root, which became very black, but scarcely affected the enamel: this he attributes to the vinegar being impregnated with the vegetables it had been employed to preserve. He took a few acidulated drops, such as are sold by confectioners, and dissolved them in water in a glass, into which he put a tooth. In three days there was a visible change, but in six days the enamel was destroyed. He made numerous other experiments, and found that acids were certain to destroy teeth in every case, in a greater or less time. In making unfermented bread, eleven and a half fluid drachms of muriatic acid are used, with twenty-two ounces of water, and three pounds of flour; he added a small quantity of muriatic acid to that proportion of water, and placed a tooth in it, and found that in twenty-four hours the enamel was nearly all gone. He next took the same proportion of acid and water, and added an appropriate quantity of carbonate of soda, bringing the liquid to the same standard as is used in the manufacture of bread; the result was, that in thirty hours, instead of twenty-four, a tooth placed in the solution had suffered in a like degree. He afterwards took muriatic acid in the proportion of one part acid to ten of carbonate of soda, and mixed it with water; this quantity of soda completely neutralized the acid, so that after some months the tooth placed in it remained as perfect as when first put there.

In a popular work on domestic cookery, Mr Thomson found the following:—"The teeth may be generally kept clean by rubbing them with a piece of soft wood, made into a kind of brush and dipped in distilled vinegar." On seeing this, he placed a tooth in distilled vinegar, in a glass: in twenty-four hours the enamel became beautifully white; in forty-eight hours there was no visible difference; at the end of three days there was a very slight deposit of lime at the bottom of the glass, and in five days the enamel could easily be rubbed off. He has seen also in another work of this kind, the recommendation to use diluted sulphuric acid as a means of cleansing the teeth, and has met with persons who had actually used such. Some persons use burnt alum, and many of the dentifrices sold at druggists contain alum and pumice-stone. "From these experiments," he adds, "I ascertain that all acids will injure the teeth; and we know, too, that acids of various kinds are used in ordinary cooking, to give seasoning to the dishes in which they are placed, and also, that acids are employed in the adulteration of food in daily use; the subject, therefore, is one of very serious importance."

The perusal of Mr Thomson's paper, and the preparation of this lecture, has led me to institute a few similar experiments, the results of which I will now introduce to your notice.

Experiment 1.—I placed a tooth in a solution of lactic acid.

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The solution consisted of, lactic acid of a strength of seventy-five per cent. of the absolute acid, fifteen minims, water one drachm. The solution had so distinctly an acid taste, that the same acidified solution of saliva would be disagreeably acid to the mouth. In thirty hours the tooth remained the same.

Experiment 2.—I placed a tooth in a similar acid solution, substituting acetic acid for lactic. The solution had a strongly acid taste. In thirty hours the tooth had slightly changed. The enamel being a little destroyed.

Experiment 3.—I placed a tooth in an acid solution containing two minims of strong nitric acid in one drachm of distilled water. The solution had a decided acid taste, such as would readily be distinguished in the mouth. In thirty hours the enamel was slightly destroyed, in spots.

Experiment 4.—I placed a tooth in a solution consisting of two minims of sulphuric acid, in one drachm of distilled water. The acid as before had a decided acid taste. In thirty hours the tooth had undergone the same change as when nitric acid was used.

Experiment 5.—I placed a sound tooth in a solution made by adding three minims of hydrochloric acid to one drachm of distilled water. The re-action of the acid solution was distinctly evident in the mouth. In thirty hours the tooth was changed as in the two experiments preceding.

Experiment 6.—I placed a sound tooth in a solution made by adding five grains of oxalic acid to one drachm of distilled water. The same distinct acid re-action was communicated to the mouth as in previous instances. In thirty hours the tooth was slightly changed. The enamel being destroyed in points.

Experiment 7.—I placed a sound tooth in an acid solution consisting of fifteen grains of phosphoric acid in one drachm of distilled water. There was the same strong acid taste communicated to the mouth. In thirty hours the tooth was scarcely changed.

Experiment 8.—I placed a sound tooth in a drachm of simple lemon juice, adding no water. In thirty hours the enamel was unaltered.

Experiment 9.—I placed a sound tooth in a solution consisting of water a drachm, and as much bitartrate of potassa as the water would take up. In thirty hours the tooth was unchanged.

Experiment 10.—I placed a sound tooth in a solution consisting of a drachm of water saturated with common salt. In thirty hours the tooth was unchanged.

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Dr Chapin Harris has some experiments similar to these, the results of which are condensed as follows :—

Acetic and citric acids so corrode the enamel in forty-eight hours, that much of it is easily removed by the fingers.

Acetic acid and common vinegar is not only in use as a condiment but it is formed in the mouth, whenever substances liable to fermentation are suffered to remain about the teeth for a considerable period of time.

Citric acid or lemon juice, though less frequently brought in contact with the teeth, acts upon them still more readily.

Malic acid or the acid of apples, in its concentrated state, also acts promptly on the teeth.

Muriatic, sulphuric, and nitric acids, though largely diluted, soon decompose the teeth ; these are in common use as tonics.

Sulphuric and nitric ethers have a similar deleterious effect, as also spirits of nitre ; these are common diffusible stimulants in sickness.

The acids of some of the salts also corrode the teeth.

Supertartrate of potassa, for example, destroyed the enamel very readily. This article is commonly used to make an acidulated beverage.

Raisins so corroded the enamel in twenty-four hours that its surface presented the appearance and was of the consistence of chalk.

Sugar had no effect until the acetous acid was formed, but then the effect was the same as from this acid when directly applied.

From these experiences, and others which might be adduced, it is obvious that even feeble acid solutions have a chemical solvent effect on the dental organs after their removal from the body. There is abundant evidence, moreover, that, in regard to the teeth, the same agents which would act on the dead teeth would, if allowed full play, act in a similar way on teeth fixed in the alveolus ; this, indeed, is proved by daily experience. I have seen, for example, all the front teeth destroyed by the use of an acid gargle, in which dilute sulphuric acid and infusion of roses were commingled ; and we saw on a late occasion that the application of an acid wash to the teeth destroyed the whole set, or nearly so. We must, therefore, accept the fact as it is written for us in natural observation, that acids applied to the tooth structure dissolve it.

Nor need we, as I think, complicate the question by referring to the law of endosmosis, or in other words the absorption of the acid substance, as a reason for the chemical result. The fact is, that the chemical effect is direct, it is superficial, *i. e.* it is exerted upon the outer portion of the enamel permanently, and extension is made by continuance of the chemical effect deeper and deeper, until the enamel is destroyed down to its dentinal basement.

Admitted, therefore, that the acids may excite such effects as

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those we have named, our next question is, do they produce the evils noted, in the living body? The vitality of the tooth being no preventive, are there any means of prevention? Unquestionably there are; in ordinary cases, the tactile sense of the tongue is the preventive. The tongue appreciates that which is injurious, and prompts such a dilution of the injurious agent, and such ready disposal of it, that the exposure of the tooth to the action is limited. Again, the alkaline properties of the saliva have a marked effect in neutralizing acid bodies, while the well-known fact, that acid substances produce, even ideally, the supersecretion of salival fluid, shows with what care Nature prepares for the evils which would inevitably succeed were such preparations not made.

In perfect health, I take it, then, that the acid foods ordinarily taken in the diet, are counteracted by rapid removal and rapid neutralization; but in many states of disordered health, the salival secretion loses its alkaline protective power, and even assumes an acid reaction, so marked as to be distinguishable to litmus. The same acidity occasionally I believe attends the secretion of the buccal glands, or the mucous fluid which is secreted from the solitary glands in the mouth. I have myself known the saliva thus acidified in various diseases of the dyspeptic type. In those instances where little ulcerous points appear in the mucous membrane, the salival has often a marked and prolonged acid reaction.

In dyspepsia accompanied with a great increase of fat in the body, there is frequent acidity. In the apthous rash of children there is frequent if not constant acidity, and so on. Some authors have gone so far as to show, that certain special diseases are attended by certain special acid secretions. It is unnecessary for us to enter into these minutiæ; suffice it to know that an acid condition may exist, and that so markedly, that the patient shall himself know of it by the sensation of acidity, and the litmus-paper tell of it by turning red.

Now, when this condition of saliva is present, there is as a consequence an active agent constantly at work on the teeth; while whatever acid foods are taken, or whatever foods are taken which in the mouth produce acid by retention and decomposition, have at once an unlimited play, and must and will affect the teeth by direct chemical action.

To recall what has been said, and to recapitulate,—the facts are (*a.*) that the acids of foods have a destructive effect on the enamel of teeth. (*b.*) That ordinarily the effects of acid foods are neutralized by the saliva. (*c.*) That the normal reaction of the saliva being lost, acid foods and drinks have the means of producing decided and injurious mischief on the dental organs by the chemical dissolution of the enamel.

The influence of putrefying animal matters on the teeth has been differently estimated. It has been urged against the idea

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that putrefying portions of food are a cause of decay, that a tooth removed from the body may be buried in putrefying animal or vegetable matter, and undergo no change after the lapse of months. A better argument in favour of this objection would be, that in the dissolution of putrefaction which follows death the teeth take no share; that in the closed vault or grave, themselves enveloped in all the compounds of decomposition, the teeth remain, and are to be found when the softer parts have been removed, in all their entirety.

But these arguments are each open to fallacy; for it is certain that putrefying substances left between the teeth may undergo under some conditions an acid decomposition; thus decomposed they necessarily act as acids, and destroy. This mode of decomposition is, however, contrary to the general rule, and exceptional; the rule being that the products of all organic decompositions are alkaline. I would suggest that much of the discrepancy between practical observers, as to the effects of decomposing matters on the teeth, is based on the non-observance of the method of decomposition. If an alkaline decomposition has been met with, the effect is *nil*—if an acid, the converse.

Even the varieties of food imbedded in the teeth may influence this result. The foods of the saccharine group all tend in their decompositions towards acetous formation. The foods of the nitrogenous group to the formation of alkaline compounds.

Regarding the special effects of sugars on the teeth, I must express, that in so far as my observations go, they tend all to confirm the common idea, that injury follows their frequent indulgence. Such injury is rather the result of a retention of the saccharine matter, and subsequent generation of acid, than the effect of the sugar itself. Curiously enough, that sweet which pleases children most is that which combines acidity with sweetness. The sweetmeat of this nature is crunched between the teeth, the saliva is saturated with it, the said saliva is retained in the mouth a considerable period, and the teeth meantime are exposed to the action of a chemical solvent.

The effects of hot drinks upon the teeth have been considered by many writers of an injurious tendency, and as exciting to caries. In the instance of a perfect tooth this theory is open to grave doubt; but it is to be admitted that in instances where the teeth are, by chemical or physical accident, injured, hot fluids are the possible excitants of internal inflammation. In this indirect manner, caries already on its way may be much accelerated; the inner portions of the dental structure giving way and their support, physical and nutritive, being withdrawn.

The influence of stimulants on the teeth may be viewed as direct or indirect. Directly, the effect of a stimulant, such as brandy, may be considered as not different from that of heated water. If the tooth is sound, the stimulant passes over it harmless; if the tooth is diseased, and the dentine is exposed, the stimulant acting as an excitant will produce all the results

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of an excitant, with sequential inflammation, and the consequences incident to that process.

Indirectly the influence exerted by the immoderate use of stimulants is more serious. The stimulant leads to dyspepsia, to the gouty diathesis, and to renal disease; from which constitutional maladies the teeth are variously affected,—as by caries, the result of acid salival secretion, or odontalgia, the result of the gout poison.

The effects of saline foods on the teeth deserve a few moments' notice. We must here seek for evidence from those who have been engaged in the superintendence of men long kept on salt diet. On this evidence, notwithstanding some facts which have yet to be given respecting the teeth of seafaring men, it must be concluded that the gums rather than the teeth are affected by the salted diet; and that in the midst of the most dire symptoms of scurvy arising from salted food, the teeth stand out untouched; or even fall out without indicating that their hard tissue has undergone destruction.

To conclude on the subject of diet and its effects, the facts will be gathered. That as regards the influence of dietary on the teeth, the carnivorous diet roll is much less injurious than the herbivorous; a fact which is borne out by the observation of the teeth of different classes of animal, the herbivorous having teeth very prone to decay; the carnivorous having teeth in which decay is rarely if ever presented.

Some valuable observations have been made at different periods regarding the teeth of sailors. It seems to be pretty generally admitted that the teeth of sea-faring men are exceedingly prone to become carious; and it has even been asserted that persons who live on the sea coast are equally subjected to the same condition. Various opinions have been offered as to the cause of this fact, of which I will quote one or two from our transatlantic authors, who have paid much more attention to the point than ourselves.

In a discussion at the "American Dental Convention," Dr Harris gave the results of his experience on this subject, and offered not only many proofs of the fact itself, but a theory as to the cause. He observed, he had often remarked the fact, and often heard officers of the navy say, that in those who had been almost constantly on the water, their teeth had decayed much more rapidly than before. He had been unable to offer any explanation, but, two or three years ago, while at Cape May, he observed of this, after he had been there two or three days, that the locks of his trunks were very singularly affected, having turned green. It seemed to him that this must be attributed to some atmospheric influence—to some acid, perhaps. But where did the acid come from? It is well known that the ocean contains salt—a muriate, or hydrochlorate of soda. Was it not possible that the evaporation going on continually on the surface of the ocean might set free, to some extent, hydrochloric acid, which, by

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diffusing itself abroad in the atmosphere, is brought in contact with the teeth at each inspiration? and might not this act prejudicially upon these organs? and was it not to the presence of this acid that the change to which he had referred was attributable? This seemed to him a very plausible and rational explanation.

Dr Dillingham, of Boston (at the same Convention), took a different view. He said, he had lived for some years in the vicinity of salt water, and he had frequently noticed the decayed condition of the teeth of seafaring men. On one occasion, while practising at Edgartown, a gentleman called on him to have his teeth examined before going on a whaling voyage. He had never seen a more perfect set of teeth than that man possessed. He requested him to call and see him on his return, and some three years afterwards he did so. Five of his teeth had entirely decayed, leaving nothing but the roots, and there were some six or seven that needed to be plugged. He had endeavoured to ascertain the cause of this, but had as yet arrived at no definite conclusion. He thought it might be referable to the use of salt provisions, and the vinegar and limes which were used so freely by seamen to prevent scurvy.

Dr Sylvester, of New York, takes a similar view of the cause, and considers the solution of the question must be looked for in a different direction from that mentioned by Professor Harris. He thinks to make this evident by one simple statement of fact. Some years since, having his attention turned to the effect of diet upon the teeth, he determined to make an examination into the condition of the teeth of the Aborigines of his country, and accordingly visited the sea coast near the city of Darien, spent a day in exhuming the remains which had been then buried thousands of years, for all he knew, and collected a bushel of teeth, among which he found only one case of disease, which resulted not from caries, but from the wearing down of the tooth until it reached the pulp cavity. Those Aborigines lived right on the sea coast; the mounds from which the teeth were taken were not more than half a mile from the sea; so that he thought if it should prove a fact that people living on or near the salt water are more subject to caries of the teeth than people living inland, they must look for the cause in another direction than the influence of salt air upon them.

So much for diversity of opinion on a well-observed fact. For my part, I do not consider that the question is as yet fully settled; but the evidence points to one common cause with the greatest force.

I remark, in passing, that the statement that people on the sea coast are subjected more than others to decay of teeth is not strictly correct. Passing a holiday, some time since, on the coast of Scotland, in Bute, and along the banks of the Clyde, I was struck with the singular fineness of the teeth of the poor and perpetual residents, and, from enquiries I have made more

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recently, regarding the occupants of our own seaport towns, I find that disease of teeth from residence on the sea coast is by no means a necessary fact. We are bound, consequently, to assume that in cases where persons resident on a sea frontier are affected by caries, there must be sought as a reason some other cause than the atmospherical influences. The cause, in fact, must be the same as obtains on board ship, and this cause I believe to be referable to acid diet, and to nothing else. The connection with food is best shown by the circumstance that the decay is most marked on ships bound to long voyages, in which large quantities of salted foods are taken, and corresponding large quantities of lime-juice to correct the effects of the salt. The lime-juice, in fact, prevents the scurvy, at the expense of the teeth.

This explains the occurrence of the disease on board ships, but how is it to be explained as occasionally occurring on the coast? I should be again inclined to consider diet as the prime cause. Some acid diet, or acid beverage. The point, nevertheless, lies open for further debate.

Sedentary occupations, and particularly those sedentary occupations which are conducted entirely within doors, and in unventilated apartments, give rise to a large amount of dental disease. This they do not directly, but by their influence on the general health. The people thus occupied invariably suffer, more or less, from long trains of dyspeptic evils. They are the subjects of acid eructations, of noisome breath, and low spirits. These people suffer speedily from the acid secretions, and caries is the result.

It has been observed by many writers, that there is a form of caries which commences, not in the body of the enamel, but in the line of gum enclosing, or rather encircling the part. It has been assumed, and, I think, with great fairness, that in these instances the mucous surface of the gum secretes a fluid of acid reaction, which is lodged between the margin of the gum and the tooth, and exerts chemical action on the bony structure. I allude to this condition now, because, in so far as my own observation leads me, this condition is peculiar to the class of dyspeptic cases marked out above as occurring in persons of sedentary life.

I have pointed out in a previous lecture the diseases which are peculiar to workers in phosphorus, lead, and mercury, as well as in men occupied in dyeing processes, where the volatile acids are used. I need not, therefore, reopen these topics.

In relation to out-door pursuits, I know of none which require special notice. These occupations are all harmonious with the end and meaning of the man who was made to live by the sweat of his brow. When, in persons accustomed to active out-door exercise, the teeth become subjected to disease, some other cause must be sought after. Some error in diet—some constitutional taint,—or some fault in hygienic regulations.

Amongst the purely external causes arising from a defective

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hygienic, uncleanliness must undoubtedly be reckoned amongst the first; and improper dentifrices amongst the second. Each is bad of its kind. Inattention to the cleansing of teeth, leads to the accumulation between them of decomposing vegetable matter and the formation of acid products, while the use of tooth-powders having active mechanical properties, produces mechanical erosion and inevitable destruction.

Mr Thomson has related that, once in his experience, he met with a crimson powder, which turned out to be brickdust. The evil results it were needless to describe. But, carbon in fine powder is also a famous dentifrice, and as injurious, or nearly so, as the brickdust.

For my own part, I doubt the propriety altogether of dentifrices of any kind; certainly of all which either wear down mechanically, such as carbon, or which wear down chemically, such as cream of tartar. The teeth require to be well cleansed, like every other part, but dentifrices have but one permanent advantage, that, viz., of finding work for the dental practitioner.

I cannot conclude this paper without a word on that all-absorbing subject—the tobacco controversy. The question, does smoking injure the teeth? is one daily asked.

Now I am bound to make one statement and one confession on this point. The statement is that, physiologically, there is no reason to suppose that tobacco-smoke materially injures the teeth themselves. The reaction of the smoke is alkaline, and, after smoking, the saliva is more alkaline than previously; hence, under some circumstances, tobacco-smoke is a corrective of an acid secretion, and hence, in some cases of carious tooth-ache, a pipe gives more speedy relief than any other remedy.

So much for the apology—now for the confession. Well, the confession is, that immoderate smoking produces serious systemic mischief. First, it fluidifies the blood, it modifies the shape of the blood-corpuscle, it produces depraved secretions, and often a confirmed dyspepsia. The secretions are loaded with alkaline salts, and I cannot hide the suspicion that, in many cases, salivary calculus results from this cause.

But there is a further evil. After confirmed smoking a train of symptoms often set in which the sensitive nerve fibres are involved. In this state neuralgia is a common symptom, and if teeth are already carious the most acute forms of nervous odontalgia.

And, there is yet another effect certainly very injurious, for the which we may bless the weed,—viz., sponginess of gum, and bleeding gum. There is, in fact, direct absorption of the alkaline matter of the smoke by the buccal fluids, and a further absorption of the fluid charged with alkali by the mucous membrane. The result is, that the nutrition of the gum is modified, and exudation of blood takes place freely on very slight causes. The blood in such cases is thin and very uncoagulable, con-

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trasted even with blood taken from other parts of the body of the same person. This thinness and want of plastic power is singularly prominent.

The chief points, then, which come before us on this occasion are—

1. That the tooth perfectly formed is, by its construction, chemical and mechanical, fitted to resist all normal external influences to which it may be subjected.

2. That the influence of diet acts in two ways, constitutionally and locally.

3. That in fœtal life or in infancy, *i. e.* prior to the presentation of the teeth, all injurious influences exerted on either set must be considered as acting through the system.

4. That in after life these injurious influences are developed—(1) through the system—as by the introduction of poisons; (2) directly by their own chemical agency; (3) indirectly locally, that is to say, by the buccal secretions.

5. That all the acid substances brought in contact with the enamel and retained there, act chemically on the enamel, destroying it, and giving rise to external caries.

5. That putrefying animal foods are not necessarily by lodgment in the teeth a cause of caries; that decomposing vegetable particles, by setting up an acid product, are such causes.

6. That saccharine matters lodged in the teeth, and undergoing acetous change, may be considered as the external causes of decay.

7. That stimulants, such as hot water and alcoholic beverages, produce no local chemical action on the teeth, but that in teeth already injured they excite to internal inflammation and its upshot.

8. That occupation has a marked influence on teeth—sometimes by exposing the occupant to peculiar foods or drinks, as in the instance of seafaring men; sometimes by causing dyspepsia and vitiated secretions, as in persons of sedentary life; sometimes by engendering habits of uncleanliness; and, lastly, by exposing workers at different occupations to chemical agents which exert a direct chemical effect.

9. That inasmuch as men are more exposed, by the varieties of their employment, to the causes of dental disease, so are they, as a body, subjected more generally to dental disorder than women, and to some diseases from which females have entire immunity.

10. That smoking does not by direct chemical means modify tooth structure; but that, by producing dyspepsia, it induces vitiated salival secretion and deposit, and a tendency, in extreme cases, to neuralgiac toothache. Finally, by direct action on the gums, it leads to spongy condition of those organs, and to the local hæmorrhagic tendency.

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COLLEGE OF DENTISTS OF ENGLAND.

Fourth Session, 1859—60.

The Council of the College of Dentists having instituted a series of Conversaziones to take the place of the ordinary monthly meetings, the first gathering took place on the evening of Thursday, October 6th, at the rooms of the College, when about two hundred gentlemen, Members of the Dental, Medical, and Literary professions, were present.

The President, George Waite, Esq., who appeared for the first time in his official capacity, opened the session by the delivery of an introductory address in the theatre adjoining the rooms of the College; the Directors of the Polytechnic Institution having kindly placed the theatre at the disposal of the College. The President's address was warmly received.

The President's Address:

Gentlemen,—In accepting this chair I feel a double duty devolves on me; first, to return you my hearty thanks for the confidence you have placed in me; and secondly, to ask you to unite with me in acknowledging the debt of gratitude we owe to those gentlemen who have preceded me, who, under trying circumstances, with the assistance of the Council of this College, have surmounted the various difficulties besetting its formation, and who have raised it to its present prosperity. I fervently hope, when the day arrives that I am no longer with you, I may leave your affairs in no worse condition than I found them.

With much pleasure I tell you that the greatest unanimity prevails in our councils. This fortunate circumstance, added to the unwearying exertions of your secretaries, Mr Rymer and Mr Hockley, emboldens me in looking forward to a brilliant career.

In reference to bygone events, I must observe that we find it necessary to bury them in oblivion, for fresh circumstances of vital importance continually present themselves. In many of these we find not only your interests but those of the profession in general seriously involved. The Council have deemed it right to lay before you full particulars of exertions lately made to uphold your dignity, confidently trusting that the line of conduct adopted will merit your approbation.

Amongst the grave questions which since my accession to

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office have demanded our attention, none have appeared of more serious import than that affecting your title or calling.

It is the opinion of our legal adviser that this question cannot be satisfactorily decided till judgment is pronounced in a court of law; pending such decision it would appear right that those who adopt the title of surgeon-dentist, whether being members of the Royal College of Surgeons or associated with any other learned body, should confine themselves to advice and operations connected with diseases and sympathies of the teeth, otherwise undue advantage might be taken of their position, and dentistry made a stepping-stone to surgical fame. I feel assured that I have the full sanction of the profession to assert, that we have never interfered with surgery beyond those operations inseparable from our profession; and it is with much pleasure I can make such assertion, for it gives me the right of claiming dentistry for dentists alone. By dentistry I mean the operations for the preservation of teeth, the science of extraction, the treatment of diseased gums and painful nerves, and the art of supplying false teeth. These operations are inseparable from the dentist's art, and constitute the science of dental surgery. I feel sure that, referring to the precedent of the College of Surgeons, to their titles prior to obtaining their charter, no court of law, with such precedents before them, will take from practitioners who have hitherto performed these operations the title of surgeon-dentists.

By this I do not wish to apply the slightest disrespect to the Royal College of Surgeons. Associated with its members, we find some of the most illustrious men of Europe. The names of Sir Charles Bell, of Sir Benjamin Brodie, and others, will be handed down to remote ages. I cannot refrain from observing that the possession of a diploma from the Royal College of Surgeons, bearing the honoured names of Cline, Abernethy, Astley Cooper, and others, was a good passport to me in foreign lands; still, in conjunction with the council of this college, we deplore an ill-judged interference with dentistry, as derogatory to their high fame. We deeply lament that, in a spirit contrary to its straightforward course, it should open its doors for a partial examination in dentistry at the dissent of this college; but we hope when their association with dentists shall have lost its charms, when the errors they have been inadvertently led into shall be apparent to them, that they may then be able, though late, to retrace their steps without compromising their dignity. The College of Dentists of England is fully competent to administer to its own requirements, and wishes neither to be interfered with nor to interfere with others. The difference it recognises in the practice of surgeons entering the profession is that they want that manipulative dexterity which men properly educated as surgeon-dentists possess.

The Council of the College of Dentists, looking forward to the time when microscopic powers, higher far than

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those now used, will reveal fresh secrets, ignore for the present the vital importance to dentists, of a few philosophical theories, which, although delightful to the scientific world, are of little use to practice, from not being founded on practical experience. The council is also alive to the truth that when surgeons enter the dental profession they frequently rush into extremes and recommend mechanical contrivances on all occasions. In operations of dentistry it has generally been observed they do not shine—a mass of patients taken from old practitioners and recommended to try them as rising men have been sorely disappointed in their talent, many on revisiting their old dentists have confessed the errors they had fallen into; while others, perplexed and tired out by recommendations which have proved unavailing, have rushed to adventurers both in this and in foreign countries, and much practice, which would otherwise have fallen to regular members of the profession, has been consequently lost.

In viewing fairly the practice of the present day, we cannot but see that false teeth are in the ascendant, while abscesses of the gums, tumours, exfoliations, and diseases of the roots of teeth, are more numerous than ever. If I stated the real cause of such evil, it is that certain men who ought to know better have too often pandered to the prejudices of injudicious parents, or succumbed to the announcement of advertisers, overlooking the principle of vitality, that essential element by which alone the teeth can flourish; neglecting to extract teeth and roots of teeth when the operation was indispensable, a general irritability of the gums has been established.

You will not, I am sure, consider me impertinent if I observe, that the vitality of the teeth was most attentively looked to by the dentists who practised at the beginning of this century—they saw that life could not flourish in the proximity of death—that the vegetable and animal creation lost vigour near noxious vapours, and that in like manner living teeth could not flourish in the proximity of decay.

A few most severe cases have fallen lately under my notice, one in which a fourth-part of the lower maxillary bone was removed. I sincerely trust that practice, pure in every way, may emanate from this college, and that all those laws which regulate life and death will be taught applicable to the teeth equally as to other parts of the human frame.

It may not be uninteresting to hear, that forty years since gold and tin-foil stoppings, and the file and chisel, were principally depended on for the preservation of teeth; mastic simply, as also in combination with opium, was extensively used to sensitive teeth—so was fumigation with narcotics—coagulating tinctures, combined with storax, shell-lac, aromatics, and other drugs, were also applied with great success; nitric acid and the actual cautery, tinfoil put into a cavity and melted with hot platinum, was much in

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vogue on the Continent, and was often very efficacious. The leading surgeons of the day were adverse to operations for the preservation of teeth when once the nerve was exposed, and then extraction was mostly recommended. The operation was principally performed with the key, but often with the forceps. Messrs Thompson, Parkinson, Spence, Heath, and others, were amongst the best extractors, and used the key with great ability. As in the present day, they well knew that safety in using this instrument depended on the perpendicular lift with the wrist, when resistance appeared great, and when the roots of teeth during extraction were sure to turn beyond the line of rotation, breaking the alveola, or giving way with the force necessary in extraction.

From the difficulty experienced in procuring false teeth in those days, from their loss being considered irreparable, great attention was paid to cleanliness, and to the operations necessary to their preservation. Stoppings which were put into the teeth were mostly of gold, and to such an extent was this metal used for this purpose that those days might be fairly called the golden era of dentistry. It may be thought strange, but it is equally true, that the finest stoppings at that period were executed with extraordinary rapidity. The success of the operation was thought to depend on the gold being worked into a well-shaped cavity before it had time to harden externally. I hold in my hand the crown of a tooth, which I stopped twenty-six years since; but, although the operation is instructive, I do not look on it as first-rate. If you will take the trouble to examine it, you will find a sunken soft portion, and also a harder part; if all the gold used had been equally introduced into the cavity, and assumed the more hardened condition, which you will see, it would have lasted a century.

With regard to the file, it was always admitted that Mr Crampton, of Dublin, was the practitioner whose operations had the highest merit. He well understood the essential secret that the file should only be applied in those cases where reparative power existed, or where the tooth to be filed possessed sufficient strength to recover its vigour. The operations of this talented dentist were much esteemed, and remarkable for their natural outline. Many a fine old gentleman has shown his teeth, preserved by Mr Crampton, with pride and delight. The late Mr Waite, my father, assured me that he made them in his early days his peculiar study. It is much to be regretted that the operations of celebrated men, who flourished in the beginning of this century, were only seen by a limited few, and that the profession had not then attained its present universality.

It will be almost superfluous to call your attention to the peculiar property which the osseous part of a tooth possesses of compensating for the loss of enamel; the health being good, and decays superficial, the file may be moderately used with safety, and in many cases it has appeared to me an error of judgment to shape holes to receive stoppings when a slight and almost imperceptible alteration may be made by the file, and which, instead of deteriorating with time, will gradually grow harder, and become more natural in outline. Changes took place in the profession after the year 1820; much practice was disengaged; many persons rushed into the profession. Amalgams came into use, facilitating operators; patients seemed determined to try the new stoppings, and the newspapers announced names and practice hitherto unheard of. Visions of beautiful outline were soon dis-

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pelled; many of the new comers, trying their hands at the file, cut teeth into most unsightly shapes, as patients said, and as the elder members of the profession will remember, with divisions as wide as turnpike gates between them.

In the year 1838, the mineral teeth, invented by Mr Ash, produced a new era in Dentistry, and it is but just to his memory to state that the profession owe much to him—facilities given of obtaining superior goods from his establishment, as well as from that of Mr Lemale and others, have much tended to the development and perfection of the mechanical part of the science.

But by far the most important event which has ever happened to the profession, and one brought about by the praiseworthy exertions of a limited few of its members, is the foundation of this College.

I trust you will appreciate its genuine spirit of disinterestedness. I fervently hope that the Dentists of England, having themselves called their College into existence, will unite, hand in hand, to support it, and join us in a heartfelt hope that it may long flourish; that hereafter from it, under the blessings of Providence, a talented and highly-gifted class of men may arise, determined to advance its character and utility. It is with the utmost satisfaction I tell you that diplomas will be issued to members of the profession in practice prior to 1859. Prizes will be given to deserving pupils, and endowments are already promised. Medical gentlemen of high ability have consented to deliver lectures to the College.

The inaugural address, delivered yesterday by Dr Richardson, at the opening of the Metropolitan School of Dental Science, is unsurpassed in the annals of medical lectures. The noble and generous support which this gentleman has given to this College claim your deepest gratitude.

The Council of this College, having thus laboured for your future advantages, trust that most of you will hereafter send your sons or relations to uphold its dignity. With regard to their preliminary studies, I may observe that we will always appreciate a sound English education; doubly so if it embraces the first principles of logic, for, by studying this science, perspicuity and clearness of thought and style will be acquired; the operations of the mind will be perfect, and the images, ideas, representations, and conceptions emanating therefrom will be correctly formed, while that fatal error, incidental to misapprehension, indistinctness, will be most safely avoided. We also wish young men to have an insight into the classics, for the professional nomenclature is interspersed with words of Greek and Latin origin, and it is impossible to understand their meaning without such knowledge. In the intercourse which your sons will have with the world, during the battle of life in which they will be engaged, they will continually be thrown in contact with persons of wealth and nobility—some of them will be consulted by royal and imperial princes. If their escutcheons cannot boast heraldic honours, emblazoned through unbroken lines of ancestry, yet they can meet these distinguished personages as man can always meet man, in all the greatness of educational superiority.

While comparative anatomy, chemistry, botany, and metallurgy will be indispensable to your education, as men of science, geology will claim your attention. The theoretical conclusions which geologists have decided, and the facts on which such conclusions have been based, are founded on mathematical science. The crust of this globe, $\frac{1}{100}$th part of the distance from the surface to

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the centre, once in a state of fusion, assumed its shape as it cooled; some knowledge of the changes of this earth, and the fossil remains in which the teeth form so prominent a part, is necessary to you, its form, its gravity, its internal temperature and volcanic action, all this will lead you on to shocks and periods when vast convulsive changes have occurred, each differing from the preceding, and of which I may briefly name the secondary or mezozoic with its ichthyosauri and pterydactiles, and the next, tertiary or cainazoic, showing a different genus of extinct creatures.

But, I cannot omit recommending to your notice the sciences of mathematics and mechanics.

This science has always been too far overlooked in the studies of the surgeon; we trust the day is not far distant when this college will have its wranglers as at Cambridge, and set an example which the College of Surgeons may well imitate. Mathematics, as you know, is divided into two parts, statics and dynamics: statics is that treating of equilibrium, and dynamics that of motion. I cannot refrain from recommending you in connection with statics to study the lever, the balance with its two equal arms, the equilibrium existing between them, and the horizontality, sensibility, and stability of the system; the wheel and axle, the cord, the pulley, the inclined plane, the wedge, the screw, and the funicular polygon or catenary. Motion, in connection with dynamics, will afford you constant amusement; velocity, as dependent on time and space, with the motions of system in general, the laws and motion of matter. In this you may extend your observations beyond this earth, and see bodies which for ages have maintained a motion once given them, still retaining such motion without any sensible alteration. In connection with dentistry I will give you a simple mathematical proposition, viz., the longer the diagonal the greater the force; you may solve this problem by considering the action of the steel-yard, the varying strength of the roots of teeth, and force necessary for extracting them, as also in the construction of long and short plates, and in the strength requisite to withstand the various degrees of pressure thrown on them.

In the action of the heart, in the formation of our joints, mathematical contrivance is most admirably displayed; the gynglimoid motions of some, the rotary of others in their glenoid cavities. The different motions imparted to the lower jaw, from the masseter and temporal muscles, should greatly interest you. To give you some idea of the force of these muscles, I can produce a gentleman who has seen his father lift, by his teeth, a man of eighteen stone from the ground and place him on a table. I cannot more strongly impress on you the vast advantages which mathematical science will give you in applying the smallest means to the grandest projects, than by that problem which Columbus solved, when he stood the egg on a table before the great philosophers of his country. With regard to the discovery of the immortal Harvey, it stands precisely in relation to disease and to anatomy, as that of our Newton does to gravitation and astronomy.

One of the great mathematicians of this age expressed to me his astonishment that the theory of constants was so little considered by medical men. He looked on the brain as destined to perform certain functions, if overtaxed in many constitutions, sure to succumb, and if not duly exercised to lose its pristine vigour; the heart also, influenced by certain conditions of the nervous system, pulsating according to a fixed ratio, its contractions and dilatations influenced by a standard of vigour, liable

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to collapse with increasing debility, and to burst asunder by the force of undue action; the blood also, and all the secretions, with variations from their usual standard, bringing consequent disease with it, each regulated by the condition assumed. He looked on grave variations of mind and form, as perturbations of the necessary mark at which their indices should point; the fœtus, with its teeth especially influenced by the irregularities of the parent, and its subsequent growth and development dependent on a duly regulated regimen. He considered that every living plant, and animal, should thrive with due oxygenization, and perish under baneful influences. He saw the run of inflammation, according to the laws of velocity, rushing impetuously to our destruction in its unchecked course.

In reference to the gums, his notions of the blood appeared to me very correct; for watching the changes taking place from the first moment when scorbutic affections show themselves in the morbidly increased condition of those vessels, building up or renovating the system, we find the gums varying from their usual character, and influenced by the condition of the blood, less coagulable than it should be, with its plastic properties lost. With little circulating or reparative power, its formative processes are impeded, and parts in which the organization is not vigorous, are the first which manifest a disposition to give way; the coats of the capillary vessels, involved in a diminished vitality, have lost tenacity and propulsive power under a stasis of blood which has taken place, which, admitting that it were healthy, would, by assuming a venous character, soon destroy the strength of the parts in which it is involved.

But more fully to point out to you the sympathies which connect the gums to the health, I will give you two cases.

An illustrious statesman, whose mouth had been previously most healthy and teeth most desirable, called on me in consequence of his gums having become suddenly affected with the peculiarities I have named. I recommended a few remedies and medical advice. He left my operating-room, in which he dressed, telling me that his carriage had been his dressing-room for some nights previously, and dined with a noble duke a few miles from London. Walking in the grounds during the evening he caught cold, and his valuable services after a few days were lost to the country. He was the immortal George Canning.

The next case was one of an opposite character. A lady, about thirty, whose teeth I had previously seen, consulted me owing to a sudden absorption of alveola—the gums had receded, and left the necks of the teeth remarkably sensitive. I applied lunar caustic to them. In about six weeks I saw her again; the roots of the teeth, especially externally and in the upper jaw, were completely bare. She died about seven days afterwards.

I must now say a few words on the future prospects of this College. Its greatness must hereafter depend on your zeal and assiduity. The examinations which the Council has instituted will be so conducted as to give those who hereafter gain our diploma a high standing. It will never be our wish to puzzle our students, or play the part of posers; it will be our earnest hope that the acquirements which we shall exact will form the groundwork of your future reputation. There is, however, an imperative duty which we owe to society; our proceedings will be narrowly scrutinized, and we shall be expected to send into the world men fitted to adorn the circles in which they will move.

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You must remember that science is progressing with rapid strides; philosophers select the teeth as presenting a vast field for scientific research, and society rewards with a liberal hand all distinguished members of the dental profession. Gentlemen, you must keep pace with the progress of this enlightened age. Although we feel compelled to exact a certain amount of surgery and anatomy from you, much more must demand your attention in your own homes: before examination, you must know those nerves which, giving sensibility to the teeth, will so directly concern you. Also the cerebral nerves in general, and ganglia connected with them, and their communicating branches. These not only account for all those remarkable sympathies which exist between the teeth and more distant parts, in various morbid and excited conditions of the body, but also often reveal the remote causes of severe neuralgic affections, for which you will be consulted. You must also, gentlemen, in your own homes, study the works of Sir Charles Bell, especially the Bridgewater treatise, so exquisitely written, and so sublimely pointing out the connection between the hand and eye. Nor can I omit, in justice to this great philosopher, whose private friendship I enjoyed, to draw your attention to his beautiful arrangement of the nerves of respiration; for till that discovery was made, their agency in producing the various voluntary, involuntary, and spasmodic acts of this function was little understood.

Nor less of importance to you in your career of literary research will be the works of Rowel, and others, on the beneficial distribution of the sense of pain. You must study the principles of sensibility; how pain, the terror of us all, is the salvation of our existence; how it checks our excesses—how, in the hey-day of our joy and feverish youth, it corrects our actions and stands "sentinel to our vices." There is no doubt but that in practice you will witness much pain. Let this awaken your liveliest sympathies, instead of brutalizing your natures. The modifications of pain which patients experience will teach you to dive into those symbolic forms known in the science of physiognomy, and characterizing emotions which will be presented to you in practice, constituting what is called the symbolic theory. You will soon, with a little knowledge of the physiognomy of the human form, learn to regulate your practice not only to the powers of endurance, but also to the wishes of your patients; and you may rest assured, that however skilful your hand and beautiful your work, if not somewhat in accordance with their wishes, it will lose you confidence and support. We may congratulate society that dental operations are not of that painful character which they formerly were, and that means are at our command of lulling the most excruciating agony.

In the administration of chloroform, where safety so much depends on absence of congestion of vital organs, a knowledge of the symbolic theories may avert much danger. With the general appearance of your patient you will learn the pure glance and expressive beauty of the eye; you will see in the mouth and nose certain convulsive twitchings which must not pass unnoticed. With regard to the lips, which you will so often touch, I must quote the words of Lavater. "Eloquent in its silence, this part of the frame is so sacred in my eyes that I scarcely dare venture to treat of it." Within the lips are the teeth. Amongst those marking the various nations are the filbert-shaped, pointing out the Anglo-Saxon race; and although it has been said that our lips, with other peculiarities, compressed in the centre, but curling at the corners to shew the canine teeth, give us in the

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battle field a ferocious or wolf-like appearance, still the world acknowledges the charm of that unrestrained and winning smile for which the fair daughters of Old Albion have been ever celebrated.

The practical conclusions which I would draw from the symbolic appearance of the lips are that anæsthetics must never be administered to those with thick fleshy lips; with such persons strumous and other dangerous tendencies to disease may be concealed. I have real pleasure in naming to you that a cordial understanding exists between the College and our transatlantic brethren. Had not the continent of Europe been convulsed by the horrors of war, a world's exhibition would have been held in London, in the year 1861, and in which case we should have been honoured with their visit. In their absence I must recommend to your especial notice a small work containing the valedictory address of Dr McQuillan to the graduating class of the Pennsylvania College of Dental Surgeons. The sentiments which this address breathes and the purity of its style, do high honour to the mind from whence it emanates.

But, gentlemen, I have already trespassed on your time; allow me, however, in conclusion, to guard you against the fatal error we often fall into when worldly matters prosper, of enjoying too soon repose and indolence fitting more properly our future years. While in practice and healthy you must bear in mind that if sloth steals upon the flights of genius, less gifted, but more persevering men, easily gain ascendancy. As, however, your minds will require some relaxation from toil, I can recommend nothing more beneficial to your future advancement than joining one of the learned societies of this metropolis, and one in which your mind and capabilities will best shine. Having made your selection and gained admission, look well to your position, and endeavour by your assiduity and gentlemanly conduct to gain the esteem of various patrons of art by whom you will be surrounded.

Lastly, if by a combination of fortunate circumstances you reach the zenith of fame, guard well every action of your life, and remember

"The loftiest oaks fall heaviest to the ground."

I thank you for the attention you have paid me, and I shall have great pleasure in placing before you any useful information which may occur to me in practice.

Dr Richardson proposed a vote of thanks to the President, which was seconded by Peter Matthews, Esq., and carried with considerable applause.

Many objects of interest were exhibited to the visitors on their adjournment to the rooms of the College. The exhibitors were, Dr Richardson, Dr Purland; Messrs Ash and Sons, Dubois, Harvey, Harnett, W. Harnett, Hislop, Hulme, Humby, Kempton, Ladd, Laurie, London Stereoscopic Company, Messrs Mather, Paine, Patrick, Pratt, Putnam, Rickets and Hammond, Robinson, Sayles (Lincoln), Tibbs (Cheltenham), Smale, Smith (Chatham), and Wetherell.

Refreshments were served in the ante-room, and the general arrangements, which were conducted by a Committee of the Council, were excellent. The meeting broke up at eleven o'clock with every expression of gratification.

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PROFESSOR ERICHSEN'S LECTURES ON THE SURGERY OF THE MOUTH AND JAWS.

(From the 'Medical Times and Gazette,' October 29.)

On Tuesday evening Mr Erichsen commenced a course of six Lectures on "The Surgery of the Mouth and Jaws," at the College of Dentists, and made some introductory observations on the relations of Surgery to Dentistry, which are well worth attention just now that it is proposed to give a special licence to Dentists by the College of Surgeons. The sentiments expressed by Mr Erichsen, we feel certain, are those of the great majority of the profession; and we trust that they will have their effect upon the Council at Lincoln's-inn fields. He said that when he had been invited by the Council of that College to give them a short course of Lectures on the Diseases of the Mouth and Jaws, he had felt great pleasure in acceding to that request. From the first foundation of their College he had taken a warm interest in the success of that Institution. Connected as he had been for many years with the teaching of Surgery in this metropolis, he could not but view with satisfaction the establishment of an Institution the object of which was to improve the education of those practising one branch of the Profession to which he belonged. In reflecting on the position of Dentistry in this country, he had often been struck by one great anomaly connected with it. This anomaly was not that any man, educated or not, might establish himself in practice as a Dentist—for, monstrous as such a licence was, yet, in this respect, Dentists stood in exactly the same position as Surgeons up to the passing of the late Act. But the remarkable anomaly in the position of the Dentists was, that whilst every other branch of the Profession had its head and home, the Dentists had none. Whilst the Physicians possessed their time-honoured College; the Surgeons an Institution second to none in the country for scientific importance; the Apothecaries their Hall, which he believed had done more for the improvement of the education of the Practitioners of this country during the last five-and-forty years than both the other Institutions put together; and whilst the Chemists had more recently established their Pharmaceutical Society, so numerous, so influential, so intelligent, and so wealthy a body as the Dentists possessed no Central Institution in which they could be incorporated, and by which they might improve the education and status of their Profession. This appeared to him to be a great anomaly; and he was rejoiced to see it removed by the institution of such a College as this, in which the requirements he had just spoken of would be fulfilled. He knew that it was the opinion of many very eminent Members of their Profession, that the College of Surgeons was the proper home for

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the Dentists; but he could not agree with those gentlemen who thought so, several of whom ranked among his intimate friends, for whose opinions he entertained a great regard. It was not his intention to enter upon this question at length—a *questio vexata* which was still under discussion, or to intrude himself into the politics of a body with which he was not directly connected,—but he must be allowed to say a few words upon the subject in explanation of the course of lectures he was about to commence. If you look to the education or examination of a Surgeon, how do they fit him for, or test his competency in, the practice of dentistry, or what similarity is there between the practice of a Surgeon and that of a Dentist? When a young man intends becoming a Surgeon, he has to spend at least four years of the best and most active period of his life in the acquisition of professional knowledge. He has to dissect and study anatomy for three winters; he has to attend Hospital practice for a similarly lengthened period; he must attend to practical Pharmacy, to Midwifery, to Medicine, and many collateral branches as well. During the whole period of his studies he scarcely hears the teeth mentioned,—certainly their diseases are never mentioned. The same is the case when he presents himself at the College for examination. "I have never heard of the Examiners putting questions about the diseases and structure of the teeth, and I believe when they do so, that the probability is that they would find nine-tenths of the candidates unprepared to answer. However skilled a student may be in the anatomy of the perineum, in the coverings of hernia, in the distribution of the minutest arterial branch or nervous twig, I doubt whether there would be one in ten who could tell you how many milk-teeth there were, in what order they appeared, and when, how, or where the first permanent molar showed itself. If you look to the practice of a Surgeon, what is there in common between it and that of a Dentist? A Surgeon has to set broken limbs, to operate for hernia, to cut for stone, to extract cataracts, to be engaged daily in the performance of a multitude of duties of a similar kind. His time is never his own; he can never be sure of any hour. But look at the Dentist. He is engaged in the practice of a pure speciality—the purest of all specialities—the very type of a speciality, I have never heard of any Dentist, though he might be a Member or Fellow of the College of Surgeons, engaging in Surgical Practice. I feel sure that if such a gentleman were called up in the middle of the night to operate on a case of strangulated hernia, or to puncture an over-distended bladder, he would at once say, 'No, that is not my business; I am a Dentist. You must send for a Surgeon' I do not, of course, mean that there are not men in your Profession who could not do these things. I know there are men who might be competent to undertake them on an emergency; but what I mean is, that the feeling of the public, and I may say

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of our Profession even, would compel a Dentist to confine himself exclusively to the practice of operations on the teeth. Now, in this respect Dentists differ from all other specialists. The most eminent oculists of the day have been and are General Hospital Surgeons, engaged in the practice of Surgery in all its branches; they will cut for stone, and operate for hernia as skilfully as they can extract a cataract. The same is the case with Orthopædic practitioners. The most eminent in London, the founder of Orthopædic Surgery in England, is a Physician to one of the largest Hospitals, and is extensively engaged in general Medical practice. But the Dentist, as I have already said, is a pure specialist; he does not, and cannot, consistently with his own duties, depart from the Surgery of the Teeth. Now, this being the case, why should a pupil be compelled to go through a course of study that has no bearing upon his practice in after life? What use can there be in teaching a young man the minute anatomy of the surgical regions and the mode of performing surgical operations, which he can never be called upon to practise—neglecting his own department of study—the teeth—in the cure of the diseases of which his after-life will be spent? I believe it is not only useless, but positively injurious, to compel young men to a course of study which they know will lead to no practical result; to force them to acquire knowledge for the sole purpose of acquiring a professional title—to learn what they can never be called upon to practise. I have had several students attending my lectures at various times who were placed in this position, and those to whom I have spoken on the subject have always complained of the hardship and drudgery and loss of time attendant on such a course of study. It was only this day that I was speaking to one of the most intelligent young men with whom I am acquainted, who is qualifying for a Dentist, but is studying to pass the College of Surgeons, and he told me that he felt that all his studies would be useless to him in after-life, and that the time so spent was in a great measure lost. As, then, neither the education of a Surgeon fits a man for the practice of dentistry, nor the examinations for a Surgeon test his competency so to practise, I cannot look upon a connexion with the College of Surgeons as in any way necessary to the Dentist, and I do not think that he ought to be compelled to pass through the portals of that institution before he is allowed to practise his own art. But though I do not consider a connexion with the College of Surgeons as necessary, there can, of course, be no objection to a Dentist qualifying himself as a Surgeon, if he thinks it expedient to do so. I look upon it as in the highest degree creditable to his industry and perseverance that he should do so, but let him become a member of the College of Surgeons just as he would become a Master of Arts or a Doctor of Philosophy. There are many men among you who, having been educated for the Medical Pro-

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fession, and having taken their Medical Degrees, have found it more agreeable or more advantageous to practise as Dentists than as Surgeons or Physicians. Such men are an honour to both Professions, and to them my remarks necessarily do not apply. But though I do not think it at all necessary that every Dentist should be compelled to be a member of the College of Surgeons before he can be allowed to practise his art, I look upon it as equally, if not more injurious that he should be allowed to practise that art without any special education to fit him for it, or any examination specially to test his competency in it. I look upon it as a very great evil that this should be allowed; and I would be glad to see it rendered compulsory in every young man who intends to enter the Dental Profession that he has followed out a certain course of education to fit him specially for it, and that he has passed through one examination that will test his qualifications to engage in its practice. I think it is of importance that he should be specially conversant with the anatomy, physiology, pathology, and surgery of all the parts connected with the teeth and mouth. Now, such a course of study is offered in an institution such as this, and it is my earnest advice that those who intend to become Dentists should take advantage of it. So far as my lectures are concerned, they will consist of a short course of six, on the 'Malformations, Injuries, and Surgical Diseases of the Mouth and Jaws.' To-night we shall commence with the subject of hare-lip and cleft-palate; and I may say, that, addressing a body of gentlemen who should be made specially conversant with these subjects, I shall enter more minutely and fully into them than I should think it necessary to do if I were addressing an audience of Medical students or Medical men."

Mr Erichsen then explained in a very clear manner the mode of normal development of the jaws, and showed how arrest of development at various stages produced the different varieties of hare-lip. After some general remarks on the principles of the treatment of the malformation, he concluded a very interesting lecture amid general marks of approbation.

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LECTURE XI.

[*Delivered on March 2nd*, 1859.]

ON CHLOROFORM AND THE NARCOTIC REMEDIAL SERIES, THEIR ACTION AND APPLICATION.

Mr President and Gentlemen,

The use of medicinal substances of the narcotic class, in such way as to produce complete insensibility, is of ancient date. Various facts connected with this subject have been collected with considerable learning and interest by Dr Simpson, the late Dr Snow, and other writers. From the writings of these, especially the last one named, I may introduce a few introductory observations, which will not only be of interest to you, but useful, as indicating by what steps the method of producing anæsthesia locally and generally has progressed until the present day. Dioscorides, one of the old Greek physicians, describes that a decoction of mandragora was given to patients by the mouth to prepare them for operation. He also states that a substance called "morion" was used for a similar purpose. A drachm of it eaten in a cake or in other food, took away the use of reason, and the patient would sleep in the attitude in which he was left eating for the space of three or four hours. Medical men, he adds, use it when they have recourse to cutting or burning.

Pliny, in like manner to Dioscorides, speaks of mandragora, and after stating that the juice of the leaves is more potent than the preparations made from the root, says that to procure sleep for painless operations it is necessary only for some persons to smell the medicines; from which remark it may be inferred that narcotism by inhalation is a practice also of ancient date. But the most interesting and at the same time the most striking passage is by Apuleius, who informs us that any one who may be about to have a limb mutilated, burnt, or sawn, may drink

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half an ounce of the wine of mandragora, and whilst he sleeps the member may be cut off without pain or sense.

At a period perhaps quite as early as that which we have glanced at, Indian hemp was in use for the same purpose by the Chinese. Dr Snow infers that the fumes of the hemp were inhaled for producing sleep, and his view is supported by a remark in Herodotus to the effect that the ancient Scythians were accustomed to inhale the fumes of burning hemp to produce intoxication, as well as by the fact that the Hindoos have smoked hemp with the same object for ages past. Omitting notice of certain other supposed means of causing anæsthesia invented in the middle ages, I would note an anecdote, quoted first by Dr Silvester and afterwards by Dr Snow, which shows that in the seventeenth century anæsthesia was practised by means of a narcotic draught.

"Augustus, King of Poland and Elector of Saxony, suffered from a wound in his foot which threatened to mortify. The Court medical men were opposed to the operation of amputation; but during sleep, induced by a certain potion surreptitiously administered, his favourite surgeon, Weiss, a pupil of Petit, of Paris, cut off the decaying parts. The royal patient was disturbed by the proceeding, and inquired what was being done, but on receiving a soothing answer he again fell asleep, and did not discover till the following morning, after his usual examination, that the operation of amputation had been really performed."

By accident and custom a variety of narcotic substances have been used to produce entire insensibility and forgetfulness of external impressions. The smoking of opium to the production of perfect anæsthesia will occur to all as a prevalent custom. In the early days of Scottish history nightshade was used as a stupifying agent in like manner, and it is said that darnel, or as it was called in Italy, imbriaca, a plant which grows amongst corn, was at one time used in the form of cake as a powerful drunken stupifier. There is some indirect proof also that these agents have been occasionally employed previous to the performance of operations. The practice, nevertheless, has never been reduced to a system till now, nor was anything definitely suggested for the production of anæsthesia as a process until the early part of the present century.

The credit of proposing narcotism in surgical operations, after the manner in which it is employed at the present time, belongs to one of our own great countrymen, Sir Humphry Davy. In the researches of this distinguished philosopher he made a series of experiments on the effects of a gas called nitrous oxide. There is not in the history of physiology any set of inquiries more valuable than this. Having taken nitrous oxide himself, and exhibited it to men and animals, Davy, in describing the effects of the agents, uses this expression, which

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I will read to you from his own work: "*As nitrous oxide in its extensive operation appears capable of destroying pain, it may probably be used with advantage during surgical operations in which no great effusion of blood takes place.*" In this sentence we have the text of all that has been since performed in the study of anæsthesia and anæsthetics.

It is remarkable, however, that a long time elapsed before the meaning of Sir Humphry Davy's labours were understood or put into practice. With the exception of a suggestion made by a country practitioner in England, as to the propriety of employing carbonic acid as a sleeping agent, we find no progress until the year 1844, when an American dentist, Mr Horace Wells, on seeing Mr Colston go through the well-known experiment of administering nitrous oxide as an amusement at a popular lecture, asked the said Colston to administer the gas to him while another dentist extracted a tooth. This was on December the 11th, and this was the first operation in our day performed after the removal of sensibility. Wells, elated with the application of the gas as suggested by him, tried to introduce it into general practice in operations. Thus used, it failed in his hands, probably because he was not sufficiently skilled as an experimentalist, and was not sufficiently acquainted with the properties of the agent.

Soon after this event a new phase is opened. Wells communicated the facts he had learned to Morton, another dentist, and on the 30th of September, 1846, Dr Morton administered sulphuric ether to a patient, and extracted a tooth without pain. This was the first application of ether vapour, but it had previously been ascertained and proved that this vapour had the power of causing effects very similar to those caused by the nitrous oxide. It has been a disputed point whether the suggestion of etherization as a practice is really due to Dr Morton; another claimant, Dr Jackson, having stated that it was he who pointed out to Morton the influence of sulphuric ether. The merits of this controversy have been very carefully canvassed by Dr Snow, and I shall here introduce word for word the observations of that writer, as embodying, all I would say, with much fairness and precision.

"Dr Morton was well acquainted with Mr Horace Wells, and had been in partnership with him. Before administering the ether to his patient on September 30th, Dr Morton had a conversation with Dr Charles J. Jackson, professor of chemistry, respecting the safety and propriety of the application, and the names of these gentlemen were associated in a patent which they took out for the discovery. Dr Jackson asserts that Dr Morton knew nothing of the effects of the vapour of ether till he gave him the information; whilst the latter says it was his intention to use the ether before he went into Dr Jackson's laboratory. It seems impossible to arrive at the exact truth on

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this point, but it is admitted on all hands that Morton was the first who administered ether to prevent the pain of an operation Dr Jackson has indeed claimed the whole merit of the discover, on the ground of the alleged information he gave to Dr Mortoy but if every word Dr Jackson says be admitted, it only appears that he suggested the use of ether to Dr Morton, just as Sir Humphry Davy had suggested the use of nitrous oxide to all the world in the year 1800. Dr Jackson had inhaled ether as hundreds of others had done, and being aware of Davy's suggestion of nitrous oxide for preventing the pain of operations, he concluded that ether might also have that effect."

Whoever may have the true right of the discovery of etherization, the practice of it soon became universal. The first operation under ether performed in this country was again by a dentist. On December the 19th, 1846, Mr Robinson operated on Miss Lonsdale for tooth extraction, in the house of Dr Boot. The ether was inhaled, and the operation was painless.

The next step in the discovery of anæsthesia consisted in the introduction of chloroform. The steps of progress were here well marked. Mr Jacob Bell tried the effect of chloric ether in the beginning of 1847. and with success, and in October of the same year, Mr Waldie. of Liverpool, knowing that chloric ether was a mixture of chloroform in alcohol, suggested to Dr Simpson, of Edinburgh, the employment of chloroform. Dr Simpson at once procured chloroform, and on the 15th of November he published his paper, in which the specific effects of the narcotic are described, and in which the practice of narcotization by chloroform is based.

Since this time some other substances have been suggested as narcotic agents. In 1853 I made the observation that the fumes arising when the lycoperdon giganteum, or common puff ball, is exposed to heat produce on inhalation a very perfect anæsthesia. The fumes of this fungus have indeed been applied for a narcotic purpose from the earliest days in the history of this country, *i.e.*, for stupifying bees before robbing the hive of the contained honey. The custom in many parts of this country has been to cover up the hive, place a piece of burning fungus beneath it, allow the smoke to pervade the hive for a few minutes, then to arise the hive, shake out the occupants, which are rendered by this process insensible, remove the sweet treasure, and return the sleeping insects back to their homes. In a little time they return to consciousness, and, fed during the winter, are ready to resume their busy work with the returning flower months. It was the simple story of this mode of narcotizing bees that led me to experiment with the lycoperdon. I soon found that I had a most valuable narcotic, possessing all the narcotic properties of chloroform without many of its risks. I have been made insensible by the smoke of the lycoperdon, and Dr Snow on one occasion inhaled it with me until he had lost all

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consciousness of sensation. Since 1853 I have narcotized more than a thousand animals with this vapour either for operation or cutting experiment, and always with success. It has also been used by various other experimentalists.

I place before you a portion of this fungus ready for use. I will burn a little of it that you may smell the fumes evolved. When I am applying it in animal experiments, I place the animal in a chamber, to the outer surface of which there is attached a small iron box perforated beneath and having a pipe opening into the box above. The animal is placed in the chamber after the fumes are pretty freely distributed through it. In from four to seven minutes the creature is entirely insensible, and will remain so often for half an hour or an hour without need of more narcotic.

When I inhale this vapour myself, and I have done so many times, I draw the fumes through a hookah pipe, letting them first pass through potash water, to clear them of carbonic acid. After three or four minutes inhalation the mind begins to lose itself in visionary fancies, and soon afterwards the insensibility is complete. There is less of the drunkenness produced by ether or even by chloroform, but, as with both these narcotics, recovery is often attended by vomiting. There are points in the action of this narcotic peculiar to itself. 1st. That the action of the narcotic is very permanent as compared with chloroform, ether, or any other similar body with which we are yet familiar. Thus I have seen an animal when over-narcotized remain insensible for nearly an hour without repetition of the dose. 2nd. In recovery the insensibility is not equally restored, the parts farthest from the heart remain insensible longest. 3rd. The action of the heart seems invariably to outlive the respiration; I mean this remark to refer to instances where the narcotic is administered in an over-dose or for a long period, so as to produce death. Lastly, the inhalation of the narcotic, while it does not modify either the fluidity of the blood or the coagulating power, produces a redness of the venous blood rendering it like the arterial in colour. These are the points of difference; in most other respects this volatile narcotic possesses the properties of chloroform.

You will naturally wish to know, after this description, what may be the chemical nature of the narcotic agent: and to what extent it is applicable in practice. To the first of these queries the answer is unsatisfactory. My first impression was that the narcotic was carbonic oxide; but I have never yet succeeded in detecting that gas in the fumes. The late Mr Thornton Herepath also came to the conclusion that carbonic oxide was the narcotic, but, like myself, did not prove the presence of the gas; he was led to the view he adopted by comparing the effects of carbonic oxide on animals with the effects produced by the fumes. Dr Snow, who once entertained a similar view, exhibited to me some compara-

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tive experiments of the same kind in 1854 But the experiments went against the wind, and Snow gave up the hypothesis. Afterwards, for he made an immense number of experiments on the subject, he thought that he had detected the presence of a cyanogen compound which would account for the effects. He showed me also some of his experiments in this direction; but on repetitiou they gave way, and to this day I can only say, regarding the narcotic vapour present in the smoke of the fungus, that it is excessively volatile; that it is not absorbable by water; that it possesses neither acid nor alkaline reaction; that when purified by repeated washing in alkaline solution, it is without smell; and that it yields nitrogen. In reply to the second query, I observe that, owing to the difficulty of obtaining the narcotic vapour in a pure state, it has not as yet been used in medical practice. In experiments and operations on animals t has been much used, its cheapness not less than its safety recommending it to notice. There is only one other observation on this substance which I need to make, but this will prove of interest to the dental practitioner. Under some circumstances the vapour acts as a local anæsthetic, and in none better than in that form of toothache where the pulp is exposed. In cases of this kind temporary relief is immediately obtained by inhaling a little of the fumes from a common pipe. A local and a slight general narcotic effect is thus received.

A variety of other agents have been tried by various experimentalists,—viz., Dr Simpson, Dr Snow, Mr T. Wakley, Mr Nunnerly, and other observers. I will state from the writings of these author, the more important of the narcotics and their effects. *Acetic ether* has been tried, and the effect of this body is considerable as an anæsthetic, but it is not adapted to practice. *Dutch Liquid* has been experimented with; this fluid possesses valuable anæsthetic properties, and in the opinion of Mr Nunnerly is as good as chloroform. *Olifiant Gas.*—This gas possesses anæsthetic properties, but is not generally applicable. *Coal Gas* has been described by Mr Nunnerly as a powerful anæsthetic, and when pure a safe and manageable one. I can repeat from experiment the correctness of this observation. *Hydrocyanic Acid* possesses powerful anæsthetic properties, and may be inhaled with extreme care. Nunnerly has made experiments with it the subject of special inquiry, and states that it is the most powerful anæsthetic known, indeed, one dangerous from its power. I have produced narcotism in various animals by hydrocyanic acid diffused in a large quantity of air. It may thus be given without proving fatal, but in my experiments it has always caused so much convulsion of the tetanic character, that its adoption, even were it less powerful, would in my opinion be impossible. *Nitrous Oxide*, or the substance experimented on by Sir Humphry Davy, failed practically in the hands of Mr Horace Wells, and is noticed by Nunnerly as a substance that could never be employed as an

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anæsthetic. Snow expressed to me often a similar opinion. I am not myself satisfied on this point. *Carbonic Oxide* breathed in the proportion of two per cent. is a powerful anæsthetic. I have made several experimentswith it,and have seen several made by Dr Snow. I agree with Mr Nunnerly that it is by no meaus safe or practicable. *Monochloruretted Chloride of Ethyle*, a substance closely resembling chloroform, was tested in 1856 by Dr Snow, and found to have excellent properties as an anæsthetic. He administered it to several patients for operations, and with some success. The difficulty of obtaining this liquid, and especially of obtaining it in a pure state, prevented the continuance of its use. One other substance, the use of which has been adopted and discontinued, is *Amylene*. This volatile liquid was also first used by Snow, who gave it between two and three hundred times to the human subject. It acts most effectually as an anæsthetic, and does not cause subsequent vomiting, a point of great importance. Unfortunately, the occurrence of two deaths from its use in the practice of Dr Snow showed it to be unsafe in its action, so that it does not, I believe, at this time continue to be employed in practice.

In this outline I have noticed all substances of moment which possess true anæsthetic powers, and admit of administration by inhalation, but which have as yet been used only experimentally. I have not noticed carbonic acid in this list, because I do not look upon it as a true anæsthetic agent. It remains for us yet to glance at the two common and well-known æsthetics, ether and chloroform. It will, however, be well, before entering on such consideration, to take up, shortly, a few points, relative to the action of anæsthetics in general.

It would seem that all these substances have in their action a local as well as a general effect; and that in fact this general influence is but an extension, and, if I may use the term, a consummation of the local. If, for instance, I open the iliac artery of a dog, and insert in it a small tube, shaped like the letter T, as you see here, I am enabled through the stem-piece to inject a narcotic into the circulation, in the course of the arterial stream, *i. e.*, towards the foot, but without stopping the course of the stream. Well, I have done this experiment with chloroform, throwing in gently five minims; and the result is that the parts supplied by the artery, the leg and foot, are made quite insensible for several minutes, until in fact the chloroform is carried away into the general system by the venous blood and is excreted. Here, then, in this experiment the animal has received the narcotic locally and experienced a local action. I I had given chloroform to breathe, the difference would have been in degree only. The chloroform would then have been absorbed into the arterial blood in the pulmonic circuit, but it would have been absorbed into the *whole* blood, and would consequently have gone not to one part alone, but through every

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artery to every part, and with the necessary result a narcotization of every part, more or less marked, according to the amount of chloroform supplied and absorbed. The same rule would hold good with every other narcotic substance of an allied character.

I have said that all the narcotic series have but one mode of action in their destruction of sensibility. I may add that this action is not altogether obscure; indeed it is not going too far to say that the *modus operandi* of these remedies is better known than that of any other class. We are indebted to Dr Snow for the insight we have thus obtained. By a singularly happy series of experiments, Snow has proved that all the volatile narcotics have one principle in common: they arrest oxidation, and in such way stop the combustion of combustible bodies. Here is an experiment in point. I diffuse through this glass chamber chloroform vapour to the extent say of five per cent. of chloroform to the air contained. Giving a little time for diffusion I now place in this chamber a lighted taper, and as you observe the taper at once goes out. I repeat a similar experiment with ether, and although ether is an inflammable body when mixed with air, yet if I am adroit in the manipulation the result is the same. I do it once more with amylene, the result is identical.

I might change the experiment a little for the purpose of illustration. I might take a portion of phosphorus, scrape it and expose it to the air. Under these circumstances I should see the surface undergo change; the phosphorus is absorbing oxygen gas, and it becomes coated with a thick white layer of oxide of phosphorus. I take another piece of phosphorus, scrape it in the same way, and expose it to air containing chloroform, and now I find that this process of oxidation does not occur.

Once more, I take a portion of fresh animal fibre, I expose this to the air and it undergoes change, putrefaction. I place another portion of animal fibre in air charged with chloroform and no such putrefaction is set up. Here, as a telling example, is a specimen of lung which was shown, thus preserved, at the Medical Society of London in 1851. It has never been removed from the bottle, and except that it has become slightly drier than it was originally, it presents no change.

The reason why chloroform and its analogues exert this arresting influence is not as yet scientifically explained.

The chloroform seems to undergo no change, and the oxygen seems to undergo no change. In our ignorance, therefore, of what absolutely occurs we have invented a term for the fact—we say that the action is catalytic, or is due to catalysis.

Any way we have the fact, and it supplies us with a glance as to the action of the narcotics on man. I must explain in what manner.

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The oxygen taken into the lungs in respiration is carried round the economy and is applied to the oxidation of the oxidizable materials of the tissues. By this process of oxidation, ever persistent during life, new tissues are elaborated, old tissues are removed. By the same process animal heat is generated, and on the continuance of the process sensation, volition and all the organic functions depend. When, therefore, chloroform or any other narcotic of the same kind is received into the lungs by the respiration, the chloroform is absorbed into the blood and is borne throughout the whole of the system. Thus carried, according to the theory of Dr Snow, it arrests the process of oxidation, and therewith the functions of volition and sensation.

Carried far enough, then, the chloroform would cause absolute death. But withdrawn at the proper moment, its volatility saves that ultimatum. The vapour escapes from the body rapidly, and in proportion to its elimination the arrested functions are restored.

In the process of narcotization certain symptoms are produced in the animal body which map out the action of the narcotic, and especially of chloroform, at different periods. Dr Snow, whose authority we must again seek, divides these into four periods or degrees. In the first degree is included "all the effects of chloroform that exist while the patient retains a perfect consciousness of where he is, and what is occurring around him. This degree constitutes all that a person remembers of the effects of the vapour, except when he happens to dream, and recollects it afterwards."

In the second degree the consciousness is lost. "The mental functions," says Snow, "are impaired but not necessarily suspended. The patient usually appears as if asleep in this degree, but if his eyelid be raised he will move his eyes in a voluntary manner. There are occasionally voluntary movements of the limbs: and although the patient is generally silent he may laugh, talk, or sing. Any dreams that the patient has occur while in this degree. The loss of sensation is now very considerable."

The third degree of narcotism is one of complete unconsciousness. Every movement made by the patient is involuntary. There is often in this degree rigidity and spasms of the muscles. The person in this state is incapable of "any perception of pain." In this stage almost all operations may be performed excepting those on the mouth, for the rigidity of muscle is frequently most marked in the muscles of the lower jaw, and the mouth is firmly closed.

In the fourth degree the breathing is stertorous, "the pupils are dilated, and the muscles are completely relaxed." The patient is always perfectly insensible.

The division of narcotization into these four stages is amongst the most exact of observed medical facts. Any one who has

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administered chloroform many times will at once recognize the truthfulness of the pictures drawn. I shall show presently that the knowledge of these stages is essential in the administration of the narcotic.

The degrees of symptom thus observed in reference to chloroform extend in a general sense to the administration of ether and amylene. In etherization, however, the first degree is very much prolonged, the second is more boisterous, the third is more evanescent, and the fourth is more decidedly stertorous. Taking them altogether, the fourth degree of narcotism may be arrived at under chloroform more quickly then the second by ether. This, even when the chloroform is given deliberately and carefully.

In the administration of the narcotics, and especially of chloroform, certain points deserve consideration in detail. They may not appear of importance as they are noticed individually; but in the mass they supply the principles upon which the safe administration of the agent may be conducted.

In the first place, before everchloro form is given to a patient, the exact physical condition of that patient should be ascertained. On this point I am and have always been at variance with an opinion of my late friend, Dr Snow. Dr Snow held that in all cases where an operation was demanded it was safe practice to give the chloroform, whatever might be the physical condition of the patient. He carried this rule to such an extreme that, in the majority of his cases, he never examined the person at all, and it is fair to admit that his rule was so far sound that out of four thousand administrations of the vapour he met with but one fatal result. Nay, it is but fair further to admit that in instances where large and painful operations are contemplated, the determination as to the operation affirmatively is sufficient to determine the propriety of administering the narcotic.

But in trifling operations, such as tooth extractions and removal of tumours, in operations, I mean, where the danger to life is not present from the operation, the rule, in my opinion, entirely breaks down.

In ascertaining, then, the physical condition of the patient two important inquiries have to be made. 1st—Is the respiration healthy? Secondly—Is the heart healthy? These two inquiries must be conducted by means of physical diagnosis, *i. e.* by the stethoscope, and by careful exploration of the chest, and I maintain, as I shall afterwards show by incidental remark, that no man is truly competent to the administration of the narcotic series who is not competent in this matter of diagnostic skill.

I lay it down as a rule, in short, which experience will every day strengthen, that the danger of chloroform is less in the mode of administration (though that is of no mean consideration) than in the exclusion of patients who could not take it without some risk more than ordinary to life.

The conditions under which chloroform becomes a dangerous

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remedy are of six kinds:—1, Cases of tubercle of the lung; 2, cases where there is irregularity of the heart from feebleness of the contractile muscular wall; 3, cases where the heart is very feeble, and the patient is loaded with fat; 4, cases where there is intense anæmia or bloodlessness; 5, cases where there is distinct disease of the kidney attended with the secretion of albumen; 6, cases in which there is marked evidence of congestion or softening of the brain. There may be many more exceptions, but these occur to me as most prevalent and determinate.

It is no intention of mine to lay it down dogmatically, that in all these conditions chloroform is to be considered as strictly prohibited. Each case must be judged by the phenomena it presents, but in every case such as I have glanced at chloroform is unadvisable in all small operations; in other words, chloroform in such examples is only advisable when it adds to the chances of success in the operation itself.

Granting that chloroform, or ether, has been decided on, it is well, wherever it is possible, to prepare the patient for it. It is best that the stomach should not be empty, and it is necessary, to avoid painful vomiting, that the stomach be not loaded at the time of the inhalation. A light meal with but little fluid, taken about two hours beforehand, is a good practice. Some practitioners whom I meet like to give the patient a glass of wine previous to the inhalation; there is no objection to this, and if there is any sign of faintness or fear it is useful to give the wine, but the quantity must be limited to two ordinary wineglassfuls, otherwise the vomiting is increased and prolonged.

The position of the patient is another matter to be considered. It is, in my opinion, of little moment whether the sitting or recumbent position be chosen, but this I am convinced is of consequence, to let the patient retain the selected position for three or four minutes before inhalation. It is a curious physiological fact that the circulation changes in time on change of position. The pulse which was at seventy when a person is standing will fall to sixty-five, and I have known it fall to sixty on the same person lying down at full length. The pulse at seventy in the sitting position will fall to sixty-seven or sixty-five on the recumbent position being taken. The rise in the pulse in changing positions in the reverse way is equally well marked. The cause of this variation yet awaits explanation; but the variation is a fact, and as it is of moment to have the circulation as steady as possible during the administration of the narcotic, the patient should not only be kept in one posture for a short time previous to inhalation, but during the whole period of narcotization. If there is an exception to this rule it is in case of syncope, then if the person is sitting it may be necessary to bring the body slowly down to the horizontal posture.

Lastly, an effort should always be made to quiet the

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hension of the patient. A few gentle words, or a brief conversation enticing the mind to the consideration of other subjects than danger, or chance of danger, is invariably a wise and safe policy.

The administration of chloroform being agreed on, the next point to be considered is the regulation of the amount to be supplied. This can only be secured by the use of a proper inhaler. To give chloroform on a linen rag, a piece of lint, or a sponge, is at once as unscientific as it is wasteful, and as wasteful as it is unsafe. Given in this way no check whatever is put upon the quantity absorbed by the patient, while the surrounding air charged also with the vapour is annoying to the operator and to all around. I have seen a bystander obliged to leave the operating table owing to the influence of the chloroform vapour, all of which was being wasted.

The best form of inhaler is Snow's, with Sibson's mouthpiece. I will pass it round that you may see its construction. There are in it two chambers; one (the outer) for holding water to secure an equality of temperature; the other (the inner) for holding the chloroform.

Down the centre of the inner chamber there passes a slight framework covered with bibulous paper, upon which the chloroform falls when it is poured into the inhaler. Air to dilute the narcotic is freely admitted by a series of holes opening into the inner chamber, while the exit opening is large, and communicates with an elastic tube one inch in diameter and six or eight inches long, for connection with the mouthpiece.

The mouthpiece, made of thin metal, is double valved. One valve directed inwards prevents the breath exhaled by the patient from re-entering the inhaler. The outer valve secures the escape of the expired air, and being under the control of the administrator of the chloroform, serves the important purpose of enabling him to admit a larger volume of air, when that is required.

The amount of chloroform required is governed almost by mathematical law, when the inhaler above named is used. In commencing the inhalation one drachm and a half of chloroform is the best quantity to put in. This will ordinarily suffice to carry an adult patient into the third degree of narcotism. It is well to commence with the exit valve altogether turned off, by which means a large volume of air is inspired and the patient is accustomed to inhale the vapour comfortably: after half a minute or so the valve may be turned on, but it need rarely be carried entirely over the opening. In the majority of cases the necessary degree of narcotism for any quick operation is thus secured; but if the operation is prolonged more chloroform may be added in half-drachm doses.

The degree to which the insensibility should be carried varies with the kind of operation. In tooth extraction it is very often not necessary to pass beyond the second degree. This is parti-

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cularly the case where only one tooth has to be removed; but inasmuch as the chloroform has to be withdrawn when the operation is being performed it will be found always best practice, when several extractions have to be made, or tedious operations to be done, to carry the narcotism to the third degree, and if there is much rigidity in the muscles of the jaw, so that the mouth cannot be opened, to the fourth degree. When the eyes are rolled upwards and the muscles are relaxed the operation may safely begin, nor is there then any fear of a return of sensation for the space of at least four minutes. The patient may move a little or flinch, but these actions are not produced by pain.

As soon as an operation is concluded the patient should be freely supplied with air; and he is much better let alone until consciousness is complete. If vomiting occurs it is, in my opinion, best to encourage it, for in the vomited matter chloroform is thrown off. The stomach *i. e.* takes on eliminatory functions, and the sooner the chloroform is expelled the sooner the vomiting ceases.

The causes of danger and of death during the inhalation of chloroform, and indeed of all the volatile narcotics, rest upon their action on one of three parts—the brain, the heart, or the lungs. Different narcotics influence these parts differently. In poisoning from ether, in so far as I can judge from experiments on inferior animals, the effect is commenced in the brain. The fumes of the lycoperdon seem first to act on the respiration, checking that function. The vapour of chloroform again appears primarily to produce a depressing influence on the heart. In nearly every fatal case after chloroform, the report goes, "the pulse suddenly stopped." The death therefore is by syncope. This view is supported by experiment. If the chest of an animal be opened, and the respiration be sustained by artificial means, the heart will continue beating for a long period of time, and its contractions and relaxations may be carefully observed. Now, in this state, if a little vapour of chloroform is blown upon the pulsating organ the action will stop and the heart will remain paralyzed until such time as the chloroform driven upon it has been removed either by evaporation or absorption. When the removal occurs then the heart once more starts off into active play.

If in an experiment of this nature, the chloroform, instead of being blown upon the heart, be injected into the great aorta at its commencement so as to feed the coronary circulation, or, in other words, the heart itself, with the narcotic, the same result, arrest in the contraction of the organ, will ensue.

I am speaking now from direct experiments personally observed; we gather from them, as well as from the symptoms in cases of fatal inhalation, the fact, that chloroform is fatal by an

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immediate influence upon the heart, a fact which Dr Sibson was the first to suggest.

After death from the narcotics certain *post-mortem* appearances have been observed which require notice. In the human subject the effects of ether have not been much recognized, owing to the lucky circumstance that there has only been one certain death. In animals killed by ether there is produced general congestion of the lungs of the right side of the heart and of the brain. The whole of the soft structures as well as the blood evolve an ethereal odour, and the blood is sometimes more fluid than ordinary. After death from chloroform, and the remarks in a general way extend also to amylene, the lungs are not specially congested. Indeed in the inspection of nearly two hundred animals killed by chloroform, I have never once found the lungs congested. I have rather found them pale and bloodless, in some instances quite white. Dr Snow records a similar experience. In the human subject, however, in several cases the lungs have been found somewhat congested. The reason of this difference, granting it to exist, is not very plain. In all cases, human and comparative, the right side of the heart and the great vessels are found engorged with blood, while the left side is usually quite empty; conditions, each alike indicating that the primary failure or paralysis is in the central organ of the circulation. The blood after death by chloroform is sometimes quite fluid, but inasmuch as it coagulates on exposure to the air, its fluidity must be considered as dependant on its confinement in the vessels, not on the presence of the narcotic vapour. This view is further affirmed in the circumstance that the addition of chloroform to newly drawn blood does not materially interfere with the process of coagulation. No special modification of the nervous system has been observed after death from the narcotics named.

The conditions which seem to have favoured the occurrence of death from chloroform have been much commented on by various authors. It has been noticed as a peculiar fact that in a great number of fatal cases, the death has happened either before the operation, or during an operation very trivial in its nature. Hence a conclusion has been drawn that a large operation is favourable to the success of chloroformization as a process. Dr. Snow was not opposed to this hypothesis; on the contrary, he was inclined to think that the loss of a moderate quantity of blood was in some instances of advantage. For my own part I can find no data of sufficient extent to guide me to a conclusion on this point.

Diseases of the lungs is a second condition which has been supposed to contribute to a fatal catastrophe from chloroform. In a few of these cases, tubercle of the lung has been found as a pre-existent malady, and so found has had possibly a share in the result.

But the diseased states which most of all are causes of death,

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are those in which the heart is implicated; the condition of heart most dangerous is that in which *the walls* of the organ, from structural change, have lost, more or less, their power of contractility. I look upon this form of disease as even more important than valvular disease, always supposing that the obstruction arising from diseased valves is unattended with symptoms of immediate danger. To stay to point out the indications of softening of the walls of the heart would lead me into an argument too long for the present time, and too purely medical to be strictly in place here. I must therefore rest satisfied with the above general statement. You will ask me what is the best treatment to be adopted in cases where during the administration of a narcotic vapour, and especially of chloroform, danger presses. The treatment is summed up in a few words. If the patient is breathing, at once withdraw the narcotic and give plenty of fresh air; if the patient is not breathing at once, do not hesitate an instant, but set up artificial respiration. This may be done either by mouth to mouth inflation, or by Dr Marshall Hall's plan of placing the patient on the face, pressing the back, then bringing him on to the side, and repeating these steps some fifteen or twenty times a minute; or, lastly, by the use of a pair of double acting bellows, such as I now place before you. These bellows, which may be carried in the coat pocket, have this advantage; in expansion they empty the lungs of the air contained, and in closure they fill the lungs with new air from the atmosphere. In inferior animals I can restart the heart, after it has ceased to beat, by these bellows, but no time is to be lost, a resting heart will continue in a condition to recover but a few seconds at most.

I have been asked to express an opinion as to local anæsthesia in Dental operations. This is soon done, for I may affirm that there is no known local anæsthetic which is at once certain, safe, and practical for operations in the mouth. Congelation is often effective, but is not convenient. The external application of a narcotic is in most cases, and in the cases best adapted to it, but partially successful. The electrical current about which we have heard so much is no anæsthetic whatever. It may divert sensation, it never conquers pain.

I have lately tried to introduce a new mode of producing insensibility locally by using a narcotic combined with the continuous electrical current. This process, which in some instances has been very successful, and in other instances equally unsuccessful in causing insensibility of the soft structures, is inappropriate as a general measure in cases of tooth extraction. It has been successful truly in a few cases of this kind, but it is only of service where the pulp cavity is laid open; for the hard tooth structure being a non-conductor of the electrical current, and a bad absorbing surface, no influence is produced at all on the sensitive structures if these be enclosed in dentine and enamel.

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I do not therefore press this method of operation on your notice, for it is a poor ambition to push forward an indifferent system because it has been suggested by oneself. Moreover, I hope at another time to show you some steps towards improvement, and indeed to bring forward the subject of anæsthesia altogether on a much more comprehensive scale.

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LECTURE XII.

[*Delivered on March 22nd*, 1859.]

THE PATHOLOGICAL AND GENERAL HISTORY OF NECROSIS, EXOSTOSIS, AND BONES.

Mr President and Gentlemen,

The term necrosis, in its original signification in medicine, implies an entire death or destruction of some part of the body; νεκρόω, to destroy, that is the derivation. In this broad and original sense the term was applied to slow mortification or gangrene of any structure; and Suavages, the great namemaker of diseases, divided necrosis into not less than six species, viz., necrosis from eating corrupted grain; necrosis from virus or poison introduced into the body; necrosis from fever; necrosis from scurvy; epidemic necrosis; and infantile necrosis. This classification is in the present day entirely forgotten except by book-worms and curiosity litterateurs. We now only apply the term to death or mortification occurring in bone or tooth.

Between necrosis of bone and necrosis of teeth there are, nevertheless, some points of difference. Necrosis of bone means the entire death of a portion of the bony structure, but in necrosis so developed there is set up beneath the necrosed portion of bone a new development, *i. e.* a regeneration of the parts destroyed. The dead portion is thus cast off and new structure appears in its place.

Necrosis of a tooth again, while on the one hand it means destruction of the tooth structure, is attended as a general rule by no attempt at restoration.

To this general rule one exception, partial in kind, may be adduced. This exception obtains when the external true bony part of the tooth, the cementum, is the seat of the necrosis. The cementum being built up and nourished on the same system as ordinary bone, and from an external vascular supply may undergo partial repair. But in the other dental structures dependant for their nourishment on the internal vascular pulp, destruction once established is final.

That there should be this distinction between the necrosis of

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bone and the necrosis of tooth, is by no means strange, when the physiological differences of the two structures are understood. The fact is, that every section of bone is supplied with blood from sources which are direct and indirect; the same also may be said to apply to nerve distribution. The result therefore is, that if one source of blood supply be withdrawn from an existent portion of a bone, the parts beneath, owing to the perfect network of blood-vessels throughout all the bone, and the anastomosis which everywhere obtains, are supplied with new blood, and new bone is thus produced to displace and occupy the position of that which has been destroyed.

With the tooth this conservation, or it is more correct, perhaps, to say restoration, is not provided for. Fed by one artery and one nerve through the pulp from which the tooth derives its main sustenance, each tooth is an independency. Withdraw the one source of supply, and the organ dies. To make a simple comparison, bone is as a continent, having communities, many in number, but, commercially, intimately linked together. If a part of the inhabitants of this continent die, the loss is replaced from without, and that which was desolate to-day is to-morrow refilled with life and activity. A tooth, on the other hand, is as an island having no means of independent support but two rivers of communication with all the world; one a river of supply from the mainland, and another a river back to the mainland. Cut off these communications for ever, and the natives of the island, however hardy, must die, the island will be lifeless always.

I have thus placed necrosis of bone and necrosis of tooth in their extreme positions towards each other; we have seen in the above how far any exception to this striking but simple law of separation prevails.

In seeking for the causes of necrosis, looking first at the disease as it occurs in bone, we find these divisible into two: into causes which are external and causes which are internal. Arising from external causes, such as local injury, it is more frequently presented on the external surface of the bone structure, in that which is called the compact structure of bone. Arising from internal causes it is most commonly developed in the internal looser or cancellous structure.

The external causes of necrosis, as I have suggested already, are mainly mechanical; the internal are constitutional, or rather are developed through the constitution, *i. e.* they are systemic. The body is subjected to the influence of some poison or some peculiar condition, and local necrosis is the upshot. Necrosis of the teeth, from whatever cause produced, is due to a suppression of function in one of two parts, or in two parts simultaneously, viz., in the vascular pulp, or in the periosteum, or in both.

In cases where both the pulp and the periosteum are equally destroyed the necrosis is perfect. In cases where the one is

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destroyed, the other remaining entire, the necrosis is imperfect, *i. e.* the necrosis is partial. Teeth thus partially necrosed will, I believe, often remain in the body a long time, giving rise to different symptoms, but symptoms not easily diagnosed in every case.

When the partial necrosis is the result of disease of the periosteum the tooth at first may be loose, but it need not remain so. It may set up surrounding irritation and discharge, but this may subside. It may give rise to pain, and this is perhaps the most characteristic sign. The pain is occasional, is induced by pressure, as in mastication, and the pain is acute, very acute when it occurs; it is often the result of pressure exerted upon the sensitive nerve entering beneath at point of the fang. In the cases where the necrosis occurs from destruction of the pulp, the symptoms, at first severe, may cease after the death of the pulp is complete. Pain may scarcely be felt at all, and the tooth may remain for years affording but little inconvenience.

Amongst the exciting causes of necrosis of the teeth may be named, 1st, accidents involving the jaw alone, or the teeth, or both teeth and jaw. An admirable specimen of necrosis thus occurring from external injury has, very kindly, been recently given to me by Mr Humby. The specimen is here at this time. The history of the case is very interesting. Some twenty years ago the patient to whom the teeth formerly belonged met with a severe blow over the maxilla. He suffered considerably for a long time from the effects, and he observed that several of his teeth were loosened. The teeth never became firm, and at last were so loose that he could actually take them out of his mouth and replace them. One day, recently, in removing one of the teeth and using more force than ordinary, a portion of dead jaw became loosened. He went to one of our hospitals, where the surgeon removed by simple traction a large portion of the maxillary bone, including the whole of the dead teeth. There was no hæmorrhage, and the jaw has filled up in such way that no unsightly appearance is left behind. There was clearly in this case a fracture transversely across the maxilla immediately above the teeth, a destruction of bone in the separated part, a separation of all the vascular resources of the teeth and entire death or mortification.

Accidents befalling the teeth themselves are again a cause of necrosis. Fracture across the body of the organ exposing the pulp is one such cause, and others which will occur to you, in all of which the cavity of the tooth is laid open and the pulp destroyed.

2ndly, Necrosis may be produced by the effects of certain poisons acting through the system. In such instances the poison produces its effect, I should presume, not primarily on the tooth, but on the jaw, and through that on the tooth. In phos-

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phorus necrosis this seems to me to be clearly the case; and in slow poisoning by mercury the same may be considered as the mode sometimes in which the death of the tooth is brought about. We have seen nevertheless in a previous lecture, that necrosis from mercury may obtain from an extension of the irritation commencing in the gums along the periosteum. This is probably the most common way in which mercury provokes the necrosis in the moderate manner in which it is administered in these times.

The changes which the teeth undergo from necrosis are characteristic and well known. In complete necrosis the tooth assumes a blackened appearance, resembling jet somewhat in character. The ordinary view is that teeth in this condition are soft in structure, but this certainly is not an invariable fact. I have seen some specimens of necrosed fangs which have been unusually hard, and some which have been brittle and hard; something, I think, depends, but I have not made observations sufficient to be sure on the point, on the condition in which the tooth is left in the alveolus. If it is broken off and covered in with gum it may, I think, remain a long period without softening, and this especially if there be no surrounding inflammation. If, on the other hand, the necrosed structure is exposed to the air, to the action of the secretions of the mouth and to purulent formation incident to neighbouring inflammation, then the necrosed structure may soften, and in fact in time may be lost altogether by chemical decomposition.

* The cause of the dark colour of the necrosed tooth has been the subject of some observation. In olden science the dark colour was considered in all decomposing parts as a mere sign of decomposition, and as a necessary sign of decomposition. Here the matter was left without further inquiry. Mr Hunter, in referring to the dark colour of a tooth which has become

* Since this lecture was delivered I have observed, in reading Mr Tomes' recent work on Dental Surgery, that he assigns as the cause of the blackening of the necrosed tooth, colouration from the red colouring matter of the blood. The whole of Mr Tomes' remarks on this point are so clear and simple, that I have pleasure in copying them entire. "The term (necrosis) is no doubt associated in the minds of many practitioners with that state which is attended with discoloration of the whole of the crown of the affected tooth. But the discoloration of a dead tooth is, strictly speaking, an accidental and by no means necessary coincidence. It depends, in the first place, upon the pulp losing its vitality when its vessels are filled with blood, and upon the ultimate decomposition of the blood globules and the solution of the colouring matter in the fluids present. These permeate the dentine, and impart to it a permanent stain, the discovery of which is looked upon as an infallible indication that the tooth is dead. The loss of the normal colour is obviously a mere consequence of the death of the pulp under certain circumstances, and a consequence which takes some time to develope.

"The depth of the stain will also be varied, the variation depending upon the age of the patient. The younger the subject, the larger and more vascular will be the pulp, and the deeper the stain produced by its decomposition. In old people, on the contrary, the pulp is relatively small, and the discoloration of the tooth consequent upon its death is but slight, and may, in fact, be altogether wanting."

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simply dead, speaks of such a tooth as in a state in which "it is capable of taking on a dye." At the same time he gives no explanation of the source of the dye or colouring stuff.

In a tooth entirely necrosed all its special microscopical characters are lost. The chemistry, too, must be materially modified, but I regret that I have no satisfactory data before me at this moment bearing on the chemical pathology of this form of dental disease.

The symptoms attendant on necrosis are in the main external rather than central, I mean around the tooth rather than in it. When necrosis occurs from external injury, involving separation by fracture of a portion of the jaw, the death of the tooth or of the teeth included in the fractured part may occur without any indication of pain in the teeth themselves. This was the fact in the case I selected for illustration. The pain was evinced in the line of the fracture and in the bony part around. In cases where the death of the tooth takes place from fracture of the crown of the tooth and exposure of the sensitive pulp, the pain is, however, for a time excruciating, unless relieved, as in the operation of pivoting, by extraction, or breaking up of the pulp. It is remarkable how long a tooth will remain sensitive when the pulp cavity is laid open by accident. I knew an instance of this kind where the patient could not summon up courage either to have the tooth extracted or to have the pulp cavity cleared. The pulp consequently sloughed away, if that expression is allowable, the tooth remaining firm from its adhesion by cementum to the alveolus; the sloughing process lasted over three months, the sensitiveness of the nerve not being lost. At last the discharge stopped and the tooth remained apparently as a senseless necrosed stump adherent by its periosteum to a cementum having yet the remains of vascularity. In this state a dentist was applied to to fix a new tooth, and he feeling the stump firm pivoted on it with much promise of success, but the pivot could never be borne, it excited deep pain, referred by the patient to the fang of the dead tooth; it excited also free discharge, and ultimately was removed. Whether the pain here produced was caused by pressure on some remaining portion of nerve, or by interference with the periosteal connection still existing between the cementum and the alveolus, I cannot say: the point of interest in the case is, that it shows how long the sensitiveness of the exposed pulp will last when left to be removed by decomposition.

A tooth undergoing necrosis may then be the cause of much pain; but a tooth absolutely necrosed is a cause of annoyance only to parts which surround it. In this way it may give rise to ache extending along the alveolus and to those local inflammatory attacks followed by purulent exudation to which I have already asked your attention in preceding discourses.

The treatment in necrosis is briefly said. You will agree

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with me, I think, in these propositions—1st, That if a necrosed tooth is quiet, and is useful for the mechanical support of a false tooth, it had better remain where it is, and fulfil partially the functions for which it was intended altogether. 2nd, That if a necrosed tooth is quiet, and is or is not covered by gum, it may remain *in statu quo*. 3rd, That if a necrosed tooth is causing local mischief, purulent exudation from the parts around it, and radiating pain, it only cumbers the ground, and is better rooted up.

The term *Exostosis*, in surgical language means, as its derivation (ἐξ, out of, and ὀστέον, a bone) implies, a tumour arising from bone. While the term having this signification has been always applied to bony structure, it has been often used in a loose and general way. It has been employed to designate any kind of enlargement of bone itself, or of the parts surrounding. Thus, malignant or cancerous disease of the bone has been brought under this head.

Sir Astley Cooper, in his works, divides exostosis into two varieties: one, "the periosteal," in which the enlargement commences between the periosteum and the bone; the other, "the medullary," in which the enlargement commences in the medullary membrane and cancelli; but he, too, held confused views on the matter, inasmuch as he classified under the name of "fungous exostosis," a form of osteoid cancer resembling the fungus hæmatodes of the soft parts.

Modern surgeons confine the term to enlargement of bone, in which the bone structures enlarge at some particular point, but in which there is introduced no new special element. Thus conceived, exostoses are of two kinds, the hard or "ivory exostoses," occurring most commonly in the compact tissue of flat bones; and the soft, or medullary exostoses, which grow more quickly, form more determinate tumours, and are most difficult to remove. In both varieties, the chemical and microscopical characters of bone structure remain the same. If an exception occurs to the rule, it relates to the first, or hard exostosis, in which the relative quantity of inorganic and organic constituents are sometimes slightly modified, the inorganic prevailing.

The causes of exostosis are often very obscure. The disease would seem, in some cases, to take an hereditary type. Pre-existing syphilitic disease appears in other cases to have formed the developing cause. Sometimes the pre-disposition being present, the disorder is excited by some slight injury to bone; at other times it occurs without any obvious excitation.

In the ordinary run of cases, the exostosed mass forms a distinct tumour, and increases simply as such, retaining only a neck of connection with the bones from which it has arisen. In other cases, the tendency to new bone growth may be wide spread, and the new developments may involve many bones, and tie one

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bone to another. I once was shown, in the museum of the Manchester Royal Infirmary, the skeleton of a woman whose ribs, posteriorly, were bound together by vertical and oblique bands of bone structure, which formed what might be considered a case-work over this part of the skeleton. This form of false development is very uncommon.

Such is an outline of exostosis, as occurring in bone; in the tooth the disease is not materially different. Perhaps, if we could understand the nature of the process in its full extent, we should find there was no difference at all between dental exostosis, and that form of bone exostosis which I have called, after Sir Astley Cooper, "periosteal." The more obvious pathological changes in the tooth, are enlargement of the fang, not unfrequently a union of the fangs, and sometimes an absorption of the intervening alveolar projection between two teeth, and union between the tooth exostosed and its neighbour. We have on the table before us, illustrations of all these varieties of exostosis. On making close inspection, we find that the enlargement is confined to that part of the tooth called the cementum, the structure of which, I need scarcely say again, is identical with bone The investing membrane is thickened, and the microscopical peculiarities observed in recent specimens lead to the inference (I am speaking in general terms, for I do not think the subject is yet thoroughly worked out in detail) that a new and excessive secretion of bone matter is being developed from the investing membrane.*

In studying the pathology of exostosis, and especially of exostosis of the teeth, we must, to arrive at a correct history, glance not only at the microscopy, but at the chemistry of the subject. In examining some of the many specimens of exostosed teeth, which you, in your kindness have laid before me, I observed that in two of them there existed between the fangs a softish, dry, earthy, whitish, yellow substance, which closely connected with the tooth was clearly not of the same structure. Filing down the fangs of these two and subjecting them to analysis, I precipitated from them crystalline bodies, which have the characteristics of uric acid, that acid which, as we have seen, is present in excess in gout, and forms with soda, the gouty connection so often met with in the joints. Coupling this fact of the detection of uric acid in the way described above, with certain symptoms which mark, as I have thought, the origin of dental exostosis, I was led some time since to link the exostosis with the gouty diathesis, and I have deferred the delivery of this lecture for several weeks, in order to extend the inquiry as to the presence of uric acid in teeth presenting signs of exostosis. I have thus examined exostosed portions of sixty teeth,

* See now on these points Mr Tomes' observations on 'Exostosis, including Dr Shelley's description of an exostosed tooth.' 'Dental Surgery,' pp. 428-440.

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not individually, but in four divisions, so as to obtain sufficient quantity of matter for analytical inquiry. In one of these groups, crystals of uric acid were distinctly yielded; in the remaining, there was no evidence whatever of the acid. The quantity of acid, moreover, supplied by one of the four groups (in which was included the pulverized mass of ten teeth) yielded less evidence of the acid than did the two teeth used in my first experiment. I am bound, therefore to conclude that in the later observation, where the acid was found, it was yielded by an exceptional tooth, and that the deposit of the acid in combination with a base in, or, I had better say, upon an exostosed growth, is of rare occurrence, but so well marked, occasionally, as to leave no doubt of its existence.

The exciting causes of exostosis of the cementum are obscure; more obscure than those which give rise to the disease in bone. The cementum enclosed in its alveolar case, secured from friction, and secured from trifling injury, is in a position to be protected from external influences. It is, moreover, peculiar as a fact, that the most perfect tooth in the jaw is to appearance as liable to the disease as one in which the enamel may be destroyed, and caries is doing its work. Further, the disease is quite independent of any indication of analogous disease in the alveolus; it appears to be connected primarily with the periosteal membrane, and to be dependent throughout on inflammatory action more or less acute occurring in that membranous surface.

In the absence of an exciting cause sufficient of itself to induce this form of inflammation, we are led to seek for a cause which is pre-disposing. From such observation as I can collect, I infer that the disease is connected with those conditions of the system which are called rheumatic and gouty. As we have before described, these diatheses are evidenced by the occurrence of inflammatory disease of fibrous structures, and if I am not incorrect, the periosteum of the teeth is in no way exceptional as a structure liable to these specific forms of inflammation.

The symptoms of exostosis are of two kinds, those which are general and those which are local. The general symptoms, if they are not decidedly indicative of rheumatism or of gout, specially of gout, border on the symptoms of these diseases. In the early stage there is feverishness more or less marked, muscular and neuralgiac pains, headache, foul tongue, and dyspepsia. In later, or chronic stages, there is frequent, if not persistent dyspepsia, increased easily by excesses and indolence. I dwell on these general symptoms as attendant on exostosis, and often premonitory of it, because I find while they are but little considered in practice, they are the more apparent and important the more they are subjected to observation.

The local signs of exostosis are difficult to define. If the tooth is diseased, *i. e.* carious, it is hard to say whether the symptoms complained of are due to the caries or to enlarge-

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ment of the fang. If the tooth is sound the diagnosis is more obscure still. The symptoms well marked are, however, somewhat after this order. The first local symptom is a sensation of fulness in the lower part of the tooth. It is described as not very painful, but annoying and attended with a feeling of increased warmth and prehaps of throbbing. The patient may be conversant of the fact that the pain is external to the tooth, or at all events that it is different to what is known as common toothache. Sometimes it is increased by pressure made upon the tooth or by a slight blow inflicted upon it, or by shaking it, but this is by no means to be considered as an invariable rule; it is often attended by pains in neighbouring parts which are either reflected through nerves or are occurring in the branches of the fifth pair from independent mischief in the nerve sheath. In time, if the exostosis is progressive, the special local signs above described become more intensified and more clearly localized; and the patient worn out with anxiety, and only the more perplexed by remedial measures, insists on extraction as the last and only resource.

The treatment of exostosis rests entirely on diagnosis. Granting that the diagnosis of the disease is clear there cannot be two opinions, I think, as to the propriety of extraction. Out of the reach of all remedial measures the mischief goes on increasing every day to lead ultimately, if left to itself, to increasing suffering and to a train of secondary evils, affecting the nervous system, dangerous, and it may be fatal, in their results.

Yet there is one point of practice to which I would direct attention in all doubtful cases. It is to endeavour to establish at once either a cure or a more correct diagnosis by a special treatment. The symptoms of exostosis may sometimes be the result of temporary irritation conveyed to the membrane surrounding the tooth, either by a poisoned blood or by reflection of pain through the nerves. If, then, the patient present decided symptoms of gouty diathesis, it will be advisable before extracting what seems to be a sound tooth, to suggest a course of dietary or of medicine, which may remove the actual manifestations of such diathesis; or, if the patient show indications of a neuralgiac tendency, it may be well to suggest the steady administration of quinine for a space of a month at least. These alternatives failing in their intention extraction is, as I have said, the last and most reasonable remedy. I need scarcely add that in these cases the extraction to be successful must be perfect. To leave behind a necrosed fang is to do worse than nothing.

Caries, a word from κειρω to abrade, or, as some have argued from the Chaldee word Karah, to dig in, means, generally, in surgical language, ulceration of bone. The term has been very much misapplied, so that by ignorant persons caries is often confounded with necrosis. Caries differs materially from necrosis,

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to the same extent, in fact, as ulceration of the tongue or of other soft structure differs from gangrene. But while this difference is pretty clearly established, our surgical authorities are in no way clear and unanimous as to the exact change which the carious bone undergoes. Mr Erichsen believes that the first stage of caries is inflammatory, but he does not localize the ulceration and discharge of purulent matter in the bone itself. "Caries," he says, "properly means a disease of the bone characterized by increased vascularity, softening, and ultimate disintegration of the osseous tissue. It appears to consist in a breaking down of the organized portion of the bone, in consequence of which the earthy matters become eliminated in a granular, molecular, and almost diffluent form in the pus formed by the inflammation of the surrounding and more healthy structures." Occurring in the teeth caries signifies a slow disintegration of the hard structures, mainly of the enamel and dentine, by which a cavity in the tooth is produced from the process of destruction progressing in the dentine without any replacement by the development of new tissue.

The first lesion in caries—I am speaking now from a general rule—commences, I believe, in the enamel, either from an accident, or from a defective condition of that structure. I have examined with as much of critical care as I can command all our more important authorities on this point, and I confess myself unable to discover any satisfactory evidence as to the commencement of the carious condition internally, *i e.*, in a tooth which has sound enamel, and is well closed in by the gum. All the evidence seems to my mind to point to the fact that caries, though progressing rapidly in the dentine, and as it were undermining the enamel, when it has once taken hold of the dentine, does not affect this latter structure until the structure itself has been exposed either to the action of the air or the action of the secretions of the mouth, or to the action of the fluids taken into the mouth.

Are, then, the causes of caries external? I think so, and although I know that the opinion is opposed to the views held on this subject by one of the highest dental authors, Professor Bell, I would, with every deference, maintain the view of an external cause. I admit, and in previous lectures I have often admitted, that a degraded condition of the system, whether that be produced by hereditary taint, by scrofula, by mercury, or by syphilis, leads to imperfect development of the hard dental structures, and in so far favours the influence of external causes; but these constitutional ailments are not alone sufficient to produce caries.

The external causes of caries range themselves into two heads:—1. The mechanical, by which some portion of the enamel structure is broken, so as to expose the dentine to the action of air, of vitiated secretions, or of injurious fluids; 2. The chemical,

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by which agents of the acid class are allowed to act upon the enamel, dissolve it, and so ultimately lead to exposure of the dentine and to its dissolution by a continuance of the solvent effect upon the dentine itself. I have already entered so fully into the nature of the chemical substances which act upon the structure of the teeth, that I should but be wasting your time by repeating what has been said.

The hypothesis of caries from deficient "vitality" of the tooth opens a wide field for argument; argument based not on the special vitality of the tooth, but on the existence of a special force called "vital" altogether. The position held by some, that there exists in the body a peculiar force which counteracts or governs chemical action, is to my view untenable. It seems to me that such position is an excuse in words for ignorance in fact. If it be admitted that the "vital" force means the perfect working, after the natural order of the body, of all the functions of the body, there can be no objection to the term "vital." The term then is defined. But to give a certain indefinite term to a force which it is admitted is undefinable, is to hide all our difficulties under mere verbiage. All inquiry might stop for ever if this unexplainable agency were in constant action, and were modifying every physical and chemical phenomenon. For example, there is fixed in the alveolus a tooth made up of chemical materials, and built from time to time out of such materials derived from the blood. Such building up is performed after a certain law maintained in the economy, and may, therefore, be called vital for word's sake; but the arrangement by which this building up is carried on is strictly physical and strictly chemical. Phosphorus combines with lime in true chemical proportions, and the mechanical laying down of the chemical materials is mathematical. Now if I bring to bear on this tooth new chemical agencies, sulphuric or nitric or acetic acids, I destroy, or at all events modify, by the setting up of new affinities, the natural chemistry, and the tooth decays, *i.e.*, it does not any longer exist in the form in which it was originally cast; I have destroyed by changing its chemistry. There is no necessity to suppose that any vital or other force has been effected.

True, the argument may, and has been used, that if destruction of the dental tissues were so readily brought about by chemical means, then caries ought to be producible by an experiment on a tooth removed from the body. The argument is specious, but unfair. In a tooth removed from the body the action of a chemical solvent is immediate and unopposed. In a tooth subjected to a chemical solvent during such time as its own active chemical processes are going on, there is an opposing force, a tergo, a force trying to produce new material, as in health, but a force exerted in such way that new material developed cannot be physically applied in the normal manner; in short, the parts built up by the chemical from materials derived from

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the blood are removed by the new chemical influence externally exerted.

Caries, therefore, is a long or a slow process, a determinative or a reparative process, according to the conditions under which it is placed. If from organic failure the normal chemistry is defective, while an external solvent chemical force is active, caries is rapid in its results. If the external influence is feeble and the natural chemistry is active, the caries is slow. In practice we meet with these different phases broadly marked out.

I know that in offering this opposition to the so-called "vital" hypothesis, the argument may be urged against me, that I have suggested no more than one term for another, "chemistry" for "vitalisine." I contend on my part, that much more than a verbal change is implied. When I speak of chemical phenomena, whether in the body or out of it, I am speaking of the appreciable, and am using a language which all can understand. When I talk about "vitalism," on the other hand, even though like Hunter I should give to it the character of a material force, I nevertheless am uttering a superstition, because I am pretending to explain unknown facts by reference to a force which exists only in the imagination, and which its own inventors admit is beyond all definition.

The true chemical changes which occur in a tooth undergoing caries, have been as yet but imperfectly studied. The microscopical changes have been considered with more care, but these also admit of further observation.*

The symptoms of caries are known better by you than by me. The same remark extends to the treatment of caries in its surgical bearings. I have therefore, in conclusion, but to add one or two sentences on the medical treatment of caries. In all cases where an obvious disposition to caries prevails, whether that occurs in the first or second sets of teeth, and whether traceable to the after effects or to the hereditary effects of syphilis or mercury, much can be done to retard the progress of the disease by hygienic and medicinal measures.

In every instance of this nature free exercise in the open air, perfect cleanliness of body and simple but nutritious foods and drinks are absolutely essential. If the digestion is always feeble, if the tongue is creamy or fissured, if the breath is offensive, if there are frequent acid emetations, which set the teeth on edge, and especially if the saliva is acid in its reaction, then special remedial measures, local and constitutional, are demanded, as well as general measures. The local remedies in these examples are simple enough. An alkaline wash, made by adding half a drachm

* When the above remark was delivered I had not had the advantage of reading Mr Tomes's admirable and laboured description of the microscopical characters of carious teeth. I now refer the reader to pages 306-10 of "The System of Dental Surgery," where the want I felt will be found very learnedly and originally supplied.

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of ammonia solution to a pint of water, or of rose water if the patient prefer it, is always advantageous, and may be used two or three times a day with great advantage. Even in cases where the saliva is not acid, but where there are carious teeth, the cavities of which are coated with an acid fluid, the same wash may be used, not only to prevent the rapid continuance of the carious attack, but in alleviation of that chronic irritation and pain which is so common an accompaniment of the condition described. Care should also be taken that the mouth is rinsed well after food, and especially after food of an acid or a saccharine description.

At the same time excessive friction with a hard brush should be avoided, as well as all dentifrices that mechanically injure. The carious tooth, in short, requires cleaning, but not polishing.

In medicinal treatment one is guided by the special signs of stomachic disorder. These are not capable of being described in detail in one lecture, and certainly not in a lecture which has, I fear, been too tedious throughout. But, in a general sense, the remedies required are of the alterative and tonic class. An occasional aperient if there is constipation; steel, in one or other of its forms, if there is anæmia; quinine if there is neuralgiac tendency. These are *the* remedies. They may be combined with the mineral acids in many cases with immense benefit, care being taken that, in the act of administration, the acid is not brought into contact with the tooth; or the quinine and iron may be given together without break in therapeutical laws, should the indications for the combination present themselves.

I have now, Mr President, a painful but a grateful duty to perform; I have to announce that this course of lectures is completed, and that our pleasant meetings are, for a period at least, at an end. Called suddenly to the performance of the lecturer's duty, and called to the exposition of subjects to which I had given no more special study than to any other branch of medical knowledge, I felt the labour embarrassing at first, and the result seriously deficient throughout. But as I have been supported by your patient attention, and even encouraged by your friendly receptions, I take the hope with me, that the effort has not been considered as altogether in vain. If to you these labours have been useful, to me not the less have they been valuable. Teaching little, I have acquired much, and amongst all present there is not one who has been more decidedly a learner.

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PROFESSOR ERICHSEN'S LECTURES ON THE SURGERY OF THE MOUTH AND JAWS.

On Tuesday, November 8, Mr Erichsen gave his second lecture at the College of Dentists, on "The Surgery of the Mouth and Jaws," the attendance of members being unusually large.

The subject of the lecture particularly considered was the treatment of Cleft Palate, and the lecturer commenced by remarking that before entering upon it he wished to refer back for a moment to a point which he had omitted for want of time, in his pervious lecture on "Hare-Lip." He alluded to the question—What is the best age to perform the operation for hare-lip? There was great diversity of opinion amongst surgeons on this point, but all were agreed that the operation ought never to be performed during dentition. although all were *not* agreed as to whether it was better to operate *before* or *after* cutting the incisor teeth. On the one hand it is argued the child can go through the operation more safely after the appearance of the teeth, because it is older, and consequently stronger. On the other hand, however, the child becomes more intractable as it grows older, and the idea of danger (from convulsions, &c.) in the younger child is purely chimerical,—as is proved by the fact that far more serious operations are constantly being performed on infants, and therefore a very young child ought to be able to bear the operation for hare-lip. In his opinion the best time to operate was at about the age of six weeks, or rather from six weeks to three months, *i.e*, before the incisor teeth are ordinarily cut. Sometimes the entreaties of parents oblige the surgeon to operate earlier, and a child is indeed capable of bearing the operation during the first day or two of existence—he had himself performed it thus early. The objections were—1st, loss of blood; 2nd, laceration of tissue (which is almost unavoidable), and, as the vitality of a very young infant is generally low, loss of blood tends to render the operation less successful than at the age he had mentioned, namely, from six weeks to three months.

Passing to the operation for Cleft Palate, Mr Erichsen proceeded to explain that the malformation termed cleft palate was closely allied to hare-lip; it originated in a want of fusion between the maxillary bones on either side, and also of the intermaxillary bones. The fissures were shown to be variable in length as well as in width. Firstly, in regard to length of fissure (a point necessary to be noted in operating). It might be confined to the uvula, which would constitute a minor degree of malformation. It might extend to the velum pendulum (or soft palate.) It may extend to the line of union between

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the superior maxillary bone, but not so far as the alveolar process; or it may extend farther and implicate the alveolar process. This last is the most extensive degree of fissure, is generally accompanied with malformed incisors, and always with double hare-lip. In width the fissures likewise vary. In one case a fissure will only be linear, in another it will be so extended by the absence of the septum nasi as to render apparent a very large cleft. These clefts were described by Mr Erichsen as giving rise to considerable functional disturbance, as, for instance, to the infant in the act of sucking, the vacuum necessary to this act could not be produced with the roof of the mouth wanting. Then deglutition could not take place properly, because in deglutition the function of the tongue is to carry the food backwards against the palate to the back of the mouth, when the soft palate is inclined backwards so as to direct it into the pharynx. Persons affected with cleft palate were alike inconvenienced in taking solids and liquids; speech was also seriously interfered with through this defect, which rendered the pronunciation of many words impossible, or at least very imperfect. The letters c, s, z, for instance, could scarcely be articulated. Persons suffering from cleft palate were extremely liable to become breathless and to pant on the smallest exertion; this could not be readily accounted for, although an undoubted fact. The above inconveniences arising from cleft palate, Mr Erichsen continued, were those which the surgeon and the scientific dentist were called upon to remedy as far as possible.

In early life a spring compress (similar in principle to the truss), exerting pressure outside the cheeks from the posterior part of the head may be made available to gradually press the divided parts nearly together, but not entirely so. In many cases the scientific dentist may construct obturators so as to entirely block up the cleft. The best material of which such obturators are constructed were shown to be gold fitted to the palate so as to cover the orifice, and to have a piece of sponge affixed to the upper part of the palate, which piece of sponge should be shaped to the cleft. This kind of apparatus was shown to be perfectly efficient in preventing communication between the mouth and nose, forming, in fact, an excellent artificial palate.

Other metals besides gold were sometimes used in constructing obturators, as were also bone, gutta percha, and vulcanite, but gold surpassed them all in utility. With regard to artificial substitutes for the soft palate, ingenious attempts had been made to form them, but these could scarcely be regarded as having proved successful, although vulcanized india rubber had been employed with good effect in a limited degree.

Mr Erichsen then went on to explain the surgical operation for division in the soft palate, entering clearly and minutely into the anatomy of the parts, which, he said, should be well under-

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stood by the practitioner before attempting to operate. The soft palate was described as a curtain dividing the mouth from the pharynx, the position and functions of the muscles being particularly dwelt upon, especially those of the levator palati. Staphylarophy (as the operation is termed), had never apparently been thought of by the ancients, and it was only within a comparatively recent period that it had been practised, although this seemed a thing somewhat extraordinary.

The first operation for cleft palate ever performed was undertaken by a French dentist, M. Le Mounier, in the year 1764, who succeeded in paring the edges of the cleft, and uniting the parts by second intention. Little is recorded of Le Mounier, except that he is described by Robert as "*un tres habile dentiste.*"

In 1817 Græfe, the German surgeon, attempted the operation, but unsuccessfully; two years afterwards, however, Roux, of Paris, practised it with such success upon an English medical student named Stevenson, that the latter read a paper on his own case before the Academy of Science. Since that time the operation has gradually come into general use.

The present mode of operating was to divide the levator palati, which paralyzed the velum, so that the edges having been pared can be brought together and kept so by sutures, without the ill effects of muscular tension. The stitches should be removed at the end of four or five days.

The operation ought not generally to be undertaken before the age of sixteen, as patients were seldom tractable enough to bear it earlier, and success depended in no small degree on tractability in the patient, as everything tending to disturb the parts had to be avoided. M. Roux had a very large number of cases on which he operated, but he was only successful in half of them, failures occurring principally from ulceration at the entrance of stitches and like casualties, before complete union had been established. The names of various distinguished surgeons who have, since Roux's time, given their attention to the subject were mentioned, and the improvements in practice introduced by them stated; these had reference principally to means adopted with the view of reducing, by longitudinal sections, the traction. Mason Warren's efforts in this direction were prominently noticed, as were those of Mr Fergusson described to be the first surgeon who had reduced these incisions to a systemized plan—a plan founded on myotomy, instead of proceeding on the previous uncertain method of making irregular incisions. Mr Fergusson might certainly in some respects have been forestalled in *practice*, but he had as certainly *not* been forestalled in *principle*.

The remedy for clefts of the hard palate by surgical operation was then described by Mr Erichsen in lucid terms. He said that the operation was scarcely to be recommended to the affluent, who could afford to pay for efficient obturators, but to the poor the operation was undoubtedly valuable. There were

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no muscular structures to interfere with the operation in the hard palate, the fibrous tissues and mucous membrane alone covering the bony arch. Mason Warren was the first to perform the operation for cleft hard palate, twenty years ago. With suitable instruments he pared the edges of the cleft, and then scraped down very carefully the tissues from either side until they united in the mesial line, and thus closed the cleft. The late Mr Avery devoted much attention to this subject, and invented many ingenious knives and other instruments suitable for the operation. More recently Mr Pollock has directed professional attention to and has simplified the performance of Warren's operation.

The lecturer explained that his observations had reference only to congenital defects. The loss of bony palate by disease or accident could not be treated surgically with success; in such cases the only remedy being to have the apertures blocked up; a cicatricial tissue is not favourable to the operation, so that the patient must remain content with the use of an obturator. The same remark applied to a soft palate injured by disease—it could not be treated surgically.

When staphyloraphy has been successfully performed, the patient should carefully attend to the education of the voice. Correct enunciation must not be expected at once; a professor of elocution is generally found to give valuable assistance in training the voice. The soft and hard palates alike required a course of education after the operation. Mr Erichsen concluded by briefly alluding to the impossibility of speaking at so late an hour on the malformations of the lower jaw, which he purposed doing in his next lecture.

COLLEGE OF DENTISTS OF ENGLAND.

Election of Members.—Since our last announcement the following gentlemen have been elected by the Council, Members, and Associates of the College:—

Members—Messrs. F. Bullen, Chester; F. Gibbs, London; W. Nightengale, Newcastle-on-Tyne; W. Penny, Lincoln; J. Shiels, Cork, Ireland; J. Shortt, M.D., Madras, India; J. Skerdon, Melbourne, Australia; and A. B. Verrier, St. Petersburg.

Associates—J. Driscoll, London; J. Greenfield, London; R. Halsey, London; and W. R. Wood, Brighton.

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PROFESSOR ERICHSEN'S LECTURES ON THE SURGERY OF THE MOUTH AND JAWS.

On Tuesday, November 29th, Mr Erichsen delivered his third lecture on the "Surgery of the Mouth and Jaws," at the College of Dentists. Having expressed regret at the unavoidable postponement of the lecture from the previous Tuesday, Mr Erichsen said that he had hitherto confined himself to the subject of malformations of the mouth and jaws. He now proposed to proceed to the consideration of injuries of the soft parts—the cheeks, lips, and structures within them; also to observations on dislocations of the lower jaw.

Injuries of the cheeks, lips, &c., resulted from cuts, blows, and accidents of all kinds; it was always the object of surgery to effect union, in such cases, by the first intention, in the same manner as in hare lip, namely, by bringing the parts into apposition and securing them with stitches or pins, until complete re-union results, particular care being necessary in treating injuries about the lips.

The inconveniences attending wounds about the cheeks were then described. If the parotid gland be cut there is danger of salivary fistula; these fistulæ are very difficult to heal. When the stenonian duct is wounded the best plan of procedure is that adopted by the French surgeon—who used a seton to form an aperture—an oblique seton aperture, which allows the saliva to flow away, so as not to prevent satisfactory union. Mr Erichsen then remarked, he wished it to be distinctly understood that the fact of his addressing an assembly of dentists did not imply that dentists were the practitioners who should treat the injuries &c. he was engaged in describing, but he considered it essential that the educated dentist should well understand their nature.

The lecturer proceeded to explain the various characters of wounds of the cheeks, palate, &c., caused by gunpowder, and he dwelt at some length at suicidal attempts on life by means of firearms, detailing the particulars of a case under his care, in which the suicide had adapted an "italian iron" to the purpose of self-destruction, by drilling a hole near the back part, and loading the interior with gunpowder; the iron being then placed in the mouth and fired from the touch-hole, inflicting frightful injury. Generally speaking, in such lamentable cases as these, little or nothing can be done beyond extempore treatment according to the nature of the injury.

Fractures and dislocations of the lower jaw were now described, some prefatory remarks on the construction of the skull and bones thereof being given, in which the employment of the arch in every direction was pointed out, as designed to impart strength and power of resistance, the arch being of all mechanical forms the best adapted to repel pressure of external force. The superior

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maxilla was rarely fractured, except from gun-shot injuries which were, of course, as likely to be inflicted on one part of the body as another. Le Druin, Wiseman (an old surgeon of the time of Charles I.) and others had, it was true, recorded cases of fracture of the superior maxilla; but such cases were nevertheless very rare, except in military practice. In treating these fractures, very little could be done beyond placing the fractured portions of bone in apposition, and bringing together the soft parts, there keeping them *in situ* by means of silver thread. A rule to be observed in practice is never to remove a tooth, however loosened, as experience had proved that in apparently hopeless cases, teeth loosened by violence, may acquire adhesion, and become firm and useful again. Fractures of the lower jaw are infinitely more common than fractures of the upper jaw, and would be still more frequent were it not for its arched shape, and the thickness of bone at the lower part. The construction of the lower jaw is of a nature combining strength with lightness. But this, notwithstanding, fracture of the lower jaw is frequent, and more so with men than with women, by reason of the former being more exposed to the action of violence in their avocations. The lower jaw may be broken at any part; but the fracture generally occurs at the side of the symphisis. A fracture of the symphisis itself is very rare, although it does sometimes occur. In some instances a fracture occurs on each side of the symphisis, constituting a double fracture; thus the centre of the jaw becomes detached and drawn down by muscular force, so as to render it difficult to replace the fractured parts in normal position. Sometimes again fractures occur near the ramus; but this is very rare, except from gun-shot injuries. Cases are on record, where the condyles of the lower jaw have been broken off. These accidents have been occasioned by kicks, as from a horse, by blows from the fist, by falls from a height, or by other acts of violence. Fractures of the lower jaw may be always recognised. The signs are—the loss, to a certain extent, of the contour of the mouth, an irregular outline of the teeth, the teeth on one side appearing higher than the other. On examining the interior of the mouth, bleeding will be observed at the seat of fracture. On telling the patient to bite or antagonize the teeth, a *crepitous* or grating sensation is perceptible. Another and sufficient proof of fracture may be obtained by the surgeon taking hold of the lower jaw, and ascertaining its seat with the fingers. In fractures of the lower jaw, there is much pain, and dribbling of saliva.

Surgeons divide fractures into simple and compound—simple where the skin remains unbroken; compound where the fractured lines are exposed to the air. In fractures of the lower jaw the gum is generally lacerated, and the injury compound, so that the process of healing is naturally retarded. The teeth in such fractures are frequently loosened.

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The treatment of fractures of the body of the lower jaw was then explained, by the lecturer, as consisting of two or three methods, namely, the use of a four tailed bandage, adjusted to the chin, and fixed round the neck and head; but this plan is not very efficient. A good method is to tie the teeth on each side of the fracture together (two or three teeth away from seat of fracture), but silk thread should not be used for the purpose, as the strain upon the ligature, together with the action of the fluids of the mouth, would soon destroy the agent. Metallic ligatures, gold or silver thread, will keep the fracture in correct apposition. The thread should be applied, if possible, without touching the gum, as it was likely to cause irritation there. Loose teeth should never be removed if it is possible to retain them. In some cases they should be retained *in situ* by tying, rather than remove them.

A simple means of keeping a fracture together is to mould a piece of gutta-percha, so as completely to grasp the lower jaw.

Mr Erichsen here clearly showed the manner of applying the gutta-percha, by means of bandages. When a very perfect union is required, an instrument, of a somewhat complicated, though most efficient nature, must be employed. This instrument was designed by the late Mr Lonsdale, of the Orthopœdic Hospital, who died suddenly two years ago. It consists of a rest for the lower jaw, and attached appliances for keeping fractured parts of the jaw in complete apposition. The instrument was exhibited and the manner of its use demonstrated by Mr Erichsen.

The lecturer then went on to explain that compound fractures are tedious to unite in consequence of contact with the air. The *manner* of the cure of fractures was next considered This consists of an effusion of lymph, which, in simple fractures, becomes callus in six weeks; but in compound fractures the process is different and longer—granulations appear and ossify, three months being often occupied in the process. If the jaw is moved, callus or new bone does not form, but fibrous (gristly) tissue; the latter unites the parts, but not by the proper bone substance. Thus the jaw cannot be said to be properly cured, nor can it be used for any purposes requiring solidity. To obviate these defects the teeth may be capped, or inflammation may be induced by means of a seton to excite the effusion of lymph, so that new bone may be formed, using Lonsdale's apparatus during the process. Where the jaw is very severely fractured, there is danger from portions of bone becoming so mixed with the saliva as to render the latter horribly offensive, insomuch that typhoid affection may ensue. To avoid this, Dupuyten recommends an incision down the cheek to the seat of fracture, and a removal of loose particles of bone. In these severe fractures the lower jaw cannot be perfectly restored, but still a useful bone may be formed.

Mr Erichsen, after entering into some further details as to the *modus operandi* in fractures, then alluded to "disclocations" of the lower jaw. He pointed out the striking fact, apparent on examin-

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ing the articulation of the jaws, of the seeming ease with which the lower jaw may become dislocated by reason of the shallowness of the support at the point of articulation, the zygmoid cavity having but little depth. Nor is the lower jaw connected to the upper by strong ligaments (one excepted). So it would appear at first sight wonderful that it is not more often dislocated; but the want of depth in articulation, and the slightness of attachment by ligaments, is amply compensated for by strength of the muscles, which in reality bind together all the bones of the body, but especially is this the case with the lower jaw. Dislocations of the lower jaw occur more frequently in women than in men, there being less strength of muscle. The age at which it is most liable to occur is from twenty to thirty. It is said not to take place in old persons and children, although no doubt it had occured to such in rare instances. It occurs from various causes, as from violence, opening the mouth too wide, &c., and sometimes when the dentist is operating for the removal of a tooth.

The three distinct kinds of dislocation of the lower jaw were then described—of both condyles or bilatoral dislocation; of one condyle uni-lateral dislocation; and sub-luxation, in which the dislocation is partial. The modes of reducing each of these kinds of dislocations was clearly explained—and, with some valuable observations on their after-treatment, the lecture was brought to a close.

On Tuesday evening, December 6th, Mr Erichsen delivered his fourth lecture on the surgery of the mouth and jaws at the College of Dentists.

Mr. Erichsen commenced by observing that, in his previous lecture, he had treated of the injuries of the jaws and of dislocation of the lower jaw; the several forms of the latter having been explained with one exception, namely, congenital dislocation of the lower jaw. This form of dislocation was shown to arise from a want of development of the temporal bone. The glenoid cavities of the temporal bone, not being existent at birth, it is supposed by some that their formation is owing to the working of the lower jaw; but this explanation appears too mechanical, their origin being more probably owing to a normal growth of the parts; and what is termed (perhaps incorrectly) congenital dislocation of the lower jaw, is owing to an abnormal development. The lecturer, having given some interesting details in illustration of this opinion, proceeded to advert to a peculiar class of injuries connected with dental surgery, and one of considerable interest to the dental practitioner, *i. e.*, injuries which have occurred, and which do occur from the accidents of swallowing artificial teeth. The false teeth so swallowed, by lodging in the air passages or in the œsophagus, are the cause of serious inconvenience and danger, life itself having been sacrificed in such cases. The term "swallowing" cannot properly be applied to this accident, as

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we can only swallow into the stomach, and we do not "swallow" into the air passages; but foreign substances may be "sucked" into the air passages, especially during the prevalance of a fit of laughter. Surgeons are conversant with such accidents. The case of the late eminent engineer, Mr Brunel, was quoted as an example. Mr Brunel, some sixteen years ago, accidentally had a half sovereign slip into the larynx, and it there remained until an opening had been made in the trachea for its removal.

Several cases are on record, in which false teeth have been drawn into the lungs. Such cases are always attended with considerable danger, when the foreign body cannot be expelled by natural efforts. The manner in which these foreign bodies are sucked in, may be understood by the familiar expression of "going the wrong way." Such accidents cause violent suffering, and have resulted in inflammation, afterwards ulceration and suppuration, terminating in death. The remedy alone available in these serious cases, is to perform the operation termed tracheaotomy, so as to form an aperture to allow the foreign body to be expelled through the larynx. Sometimes a considerable time elapses after the operation before expulsion. In Mr Brunel's case six weeks intervened; and, in the meantime, he exercised himself violently by a turn-table, which turned him completely and suddenly over. In one of these exercises the half sovereign was happily expelled. For substances lodged in the larynx, bronchi or lungs, tracheotomy is the only remedy.

The danger from swallowing false teeth is enhanced by the sharp edges, &c., of the plate on which the teeth are mounted. The accident occurs sometimes during sleep, and sometimes whilst eating the teeth drop towards the back of the mouth, and are driven down into the œsophagus. The shape of the piece is of a nature to render it impossible to push it either up or down, and the use of the probang is impracticable from the danger of wounding the walls of the pharynx and of the carotid artery, with the sharp edges of the gold plate. When the piece becomes fixed in the œsophagus it becomes necessary to perform what is termed the œsophagean operation; this consists in laying open the lower part of the pharynx—a delicate and dangerous operation but one, nevertheless, which has been performed successfully in several cases.

Gutta-percha pieces are sometimes swallowed; these are removed with more facility in many instances, but not always. Mr Erichsen here recorded a case in which he had been consulted where the patient had three years previously swallowed some teeth mounted on a gutta-percha plate, and which could not be detected in the œsophagus by the surgeons who had attended him, nor was Mr Erichsen more successful, for he could by no means detect the presence of the teeth. Nothing, therefore, could be done, and the patient went about his usual work as best he could. Two months after Mr Erichsen's examination, the patient, whilst at dinner, vomited a quantity of blood, and death immediately

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followed. After death the plate was found fixed, or rather imbedded in the side of the æsophagus, so that the outer portion of the plate presented a smooth surface with the æsophagus, and offering no obstruction; so it was thus impossible to detect the foreign body by feeling. This patient had been his own dentist; and had constructed the plate in so unscientific a manner, as to lead to the fatal result described.

Mr Erichsen next proceeded to the consideration of diseases of the jaws and appendages of the jaws, commencing with diseases of the soft parts.—1st. Diseases of the nerves, particularly the nerves of the lower jaw. In a surgical point of view there is no more puzzling affection than neuralgia in all branches of the fifth pair. It arises from a variety of causes, amongst others from diseased teeth. The patient is always ready to blame the teeth as the cause of neuralgia, even when they have nothing to do with the affection, hence the extraction of innocent organs is needlessly insisted upon. Neuralgia arises from other causes besides decayed teeth, and it is kept up by other conditions of nature. It may be considered a rule that neuralgic pains never occur in healthy persons. The great cause, perhaps, is to be ascribed to a debilitated state of the blood. In the words of an eminent authority it is the "prayer of nerves for healthy blood." Neuralgia is particularly common in anæmic females. It is intimately connected with malaria, and when it thus occurs a change of residence is necessary. Another most persistent and inveterate form of neuralgia, and an incurable form of the affection, arises from a diseased state of the bony canals of nerves—the canals of the inferior dental nerves especially. A bony deposit is found in the canal, and thus the nerve becomes compressed. In such cases the pain is not felt at the point of pressure, but at the extremity of the nerve. This form of neuralgia is regarded as incurable. The treatment should be constitutional and local. Good diet is essential, and a preparation of iron, in porter, beef tea, &c., is a useful remedy. In malarial influences, (where persons suffer from living approximate to foul ponds, or the like,) quinine and arsenic have a most marked effect for good.

Of the *local applications*, not in themselves curative agents, two remedies are said to exercise a beneficial effect.

1. Galvanism.—Mr Lobb in a recently published work says Pulvermacher's Chain has a very marked influence in removing pain, the chain being easily applied so as to pass a current of electricity along the nerve.

2. Subcutaneous injections of morphia have been usefully employed, but this remedy cannot be pronounced perfectly safe, for morphia subcutaneously injected has a more powerful effect than when taken internally. One grain of morphia may be adminstered internally with safety, but it produces deep sleep. The same quantity injected under the skin has been reported as fatal. Half a grain dissolved in alcohol and injected under the skin will send

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a person to sleep in less than ten minutes—if this effect be not produced the half grain may be repeated. The instrument used is a glass syringe of peculiar shape. Relief is generally soon obtained, but there is some uncertainty as to the result. Dr Wood, of Edinburgh, first introduced this remedy.

After some further general observations of a practical nature on neuralgia and its treatment, the lecturer spoke of "Diseases of the muscles," *Rigidity* was occasionally met with, especially rigidity of the masseter. In a case which came under his observation the rigidity was permanent, and so great was the inconvenience experienced that deglutition was difficult. He did not consider the proposal to make a section of the muscle of any use, nor indeed was he aware of any remedy. In the form tetanus, termed trismus, or lock-jaw, the rigidity may at once be removed by the inhalation of a few drops of chloroform. The cheeks and soft substances outside the jaws are occasionally so much contracted from cicatrization after burns, &c., that the patient is unable to speak or even swallow without difficulty. Here a subcutaneous dissection will give relief.

Hypertrophy of the tongue may occasion considerable deformity and inconvenience, but cases of this affection are very rare; he (Mr Erichsen) had seen one case only, at University College Hospital. After dwelling at some length on malformations of this nature, "Diseases of the bones of the jaw," principally of the lower jaw, were alluded to by the lecturer. 1st. Of inflammation of the dense fibrous membrane, known as the periosteum This inflammation is of two characters—rheumatic and syphilitic—sometimes they are conjoined. The peculiarity of the affection consists in the severity of the pain. Periostitis is chiefly of a nocturnal character, and is remarkably periodical. The periosteum in the normal state is not sensitive, it is only when stretched, as by inflammation, that it becomes liable to intense pain.

The *treatment* is simple and successful. It is, however, most important to form a correct diagnosis between *periostitis* and *neuralgia*, as the treatment of the two affections must be different, although the pain is very much in common.

1st. *Neuralgia* mostly occurs in feeble people. The pain shoots along the course of the nerve and can be traced. There is usually a painful spot in the skin from whence the pain seems to diffuse itself amongst the integuments. There is tenderness of the skin, very often intermitting, but which comes on by day as well as by night. It is rather soothed by warmth.

In *periostitis* the pain occurs oftener in men than women, and especially among the plethoric. It does not come on in the day-time, but almost always at night, generally after the small hours. Heat increases the pain. It does not run down the track of any particular nerve. There is no cutaneous susceptibility, and the teeth sometimes appear to become elongated.

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The treatment of periostitis must have reference to its rheumatic or syphilitic character.

The great remedy is iodide of potassium, which has a wonderful tendency to soothe and comfort the patient; it must be administered with a saline mixture, or in the rheumatic form with an aperient; but in the syphilitic, the iodide of potassium must be taken with quinine, three or four grains four times a-day. When nodes exist a sub-cutaneous incision should be made, and leeches and blisters may be applied with advantage.

The concluding portion of the lecture was devoted to the consideration of diseases connected with the bones, namely, caries and necrosis of the bones. Mr Erichsen described caries of the jaw bones as of very rare occurrence, it being rather a disease of the soft and spongy bones. He was not prepared to say that it does not occur at all; but, when it does, it is from the effects of syphilitic disease. The description of caries, known as the "worm-eaten," is now seldom met with. The worm-eaten caries is distinguished by appearing in the form of an ulcer. The treatment of necrosis of the jaw bones should be constitutional. *Necrosis* of the maxillary bones is frequent. The term necrosis means, death of the bone. Time only permitted allusion to one form of this disease—*i.e.*, the lucifer match disease. This peculiar form is one special in origin and cause, almost deserving of separate consideration. The disease is the true necrosis of the bones of the jaws affecting the persons employed in the manufacture of lucifer matches, and is traced to the inhalation of the fumes of phosphorus. The disease was first detected at Muremburg, in Germany, where the manufacture of lucifer matches is extensively carried on. Von Bibron and others, who have investigated the disease, agree as to the cause and effect of the malady. From some notes taken of fifty cases, it appears the disease attacks pretty equally both the upper and lower jaws. Of these fifty cases the upper jaw was attacked in twenty-one cases, in five both jaws were affected, and in the rest the lower jaw only. Thus it would seem that the lower jaw is somewhat more liable to the disease than the upper. The disease does not originate in the teeth but in the jaws; and it is a remarkable fact, that persons with sound teeth are not liable to it at all. The phosphoric acid fumes are excluded from the jaws until the teeth become faulty, and an opening is thus made permitting of their pernicious effects upon the alveoli and jaws. The disease is of a fearful nature, it frequently results in the destruction of the entire jaw, and sometimes in death, but is happily less frequent now than formerly owing to the exertions of Dr Letheby and others who have exerted themselves to master the disease as far as possible.

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